DOCUMENT RESUME

ED 175 080 EA 011 746

AUTHOR	Coons, Maggie, Ed.; Milner, Margaret, Ed.
TITLE	Creating an Accessible Campus.
INSTITUTION	Association of Physical Plant Administrators of Universities and Colleges, Washington, D.C.
SPONS AGENCY	EXXON Education Foundation, New York, N.Y.
PUB DATE	78
NOTE	151p.
AVAILABLE FROM	American Association of Physical Plant Administrators of Universities and Colleges, Eleven Dupont Circle, Suite 250, Washington, D.C. 20036 ($4.50)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Architectural Barriers; *Architectural Elements; Building Improvement; Campus Planning; Civil Rights; College Programs; *Facility Guidelines; *Facility Inventory; Facility Requirements; Federal Regulation; Higher Education; Instructional Aids; Mainstreaming; *Physical Design Needs; *Physically Handicapped; Science Laboratories
IDENTIFIERS	Rehabilitation Act 1973

ABSTRACT

This book was developed to help administrators meet the challenge of compliance with the regulations implementing Section 504 of the Rehabilitation Act of 1973. All colleges, universities, and other organizations that are funded by the Department of Health, Education, and Welfare (HEW) have until June 3, 1980, to make structural modifications necessary to make their programs fully accessible to handicapped persons. Programs are to be accessible now in all cases in which structural modifications are not necessary. Nine chapters and an introduction trace the steps in developing a program for accessibility, from understanding what constitutes a barrier in the built environment to specific recommendations on site and building design and design of science laboratories. The functional relationships between various disabilities and the use of the environment are described. Design requirements associated with these functional relationships are described and illustrated. State of the art information about instructional aids is broken down into three groups: instructional aids for the mobility impaired, aids for students with sight disabilities, and aids for students with hearing disabilities. The final chapter discusses resource and funding sources. (Author/MLF)

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Creating An Accessible Campus

Edited by:
Maggie Coons
Margaret Milner

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Published by the Association of Physical Plant Administrators of Universities and Colleges
Funded by a grant from the Exxon Education Foundation

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Library of Congress Card Number: 78–72957

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Printed in the United States of America.

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Dedication

Creating an Accessible Campus is dedicated to all past, present and future handicapped students. This publication and the United States Department of Health, Education and Welfare's (HEW's) Section 504 regulations reflect a common goal—developing an environment in which all individuals can reach their fullest potential as human beings.

Efforts to develop accessible buildings on college and university campuses can have an impact far beyond that of compliance with HEW's Section 504 regulations. They indicate a growing recognition that an accessible environment can benefit all members of society — the able-bodied, the aged, the temporarily disabled, as well as persons with permanent physical handicaps. Being handicapped is a condition that can affect any of us, at any stage of life.

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Preface

Institutions of higher education have frequently been in the forefront in expanding access to education and employment for women and men from all races and backgrounds. Concerns for the rights of minority groups to quality education has spurred various education associations to organize action groups to provide leadership and technical support programs to the higher education community.

During the past decade, some campus administrators have worked voluntarily to provide space accessible to the handicapped. The higher education community now looks to these administrators and their campuses as models when seeking ways to comply with regulations released by the Department of Health, Education and Welfare (HEW), under Section 504 of the Rehabilitation Act of 1973. The regulation, designed to broaden the opportunities available to handicapped persons, applies to all colleges and universities that receive federal funds.

To assist institutions with their compliance efforts, several higher education associations — including the Association of Physical Plant Administrators of Universities and Colleges (APPA) — created Project HEATH (Higher Education and the Handicapped) as a means to provide technical assistance to college and university administrators in developing accessibilty to programs at the least possible cost to institutions. The project, a cooperative endeavor, is coordinated by the American Council on Education.

APPA contributed to the project by preparing *Planning for Accessibility*, a guide to help institutional administrators deal with the first milestone set in the regulations—the development, by December 3, 1977, of a campus transition plan. Within a six-month period APPA had distributed more than 7,000 copies of the guide. APPA provided additional services through a "Handicapped Hotline," a consultants registry and referral service, and a series of technical bulletins that appeared in the *APPA Newsletter*.

As part of the HEATH project, the National Association of College and University Business Officers issued a special report to the higher education community regarding interpretation of Section 504 regulations. It later published comprehensive guidelines related to the program evaluation requirements as outlined in the regulations.

The College and University Personnel Association held a series of training seminars to examine issues related to overall program accessibility and employment of handicapped persons. The American Association for Higher Education through an information clearinghouse, NEXUS, provided a vital link to information on program accessibility requirements.

HEW has outlined a variety of methods available to campus administrators in their efforts to achieve the goal of program accessibility prescribed in the Section 504 regulations. Of all the methods described, the most extreme would be the modification or structural change of an existing facility or the construction of a new facility.

APPA, in order to help the higher education community develop accessible programs and facilities, has produced this publication, based on a series of related technical support programs. I recommend that you carefully analyze your institution on the basis of the ideas, goals and suggestions contained in *Creating an Accessible Campus*.

The American Council on Education is pleased to serve as coordinator and a leader for the organizations associated in this project.

Dr. J.W. Peltason
President
American Council on Education

Foreword

The development of this publication has been a long and rewarding process. As project administrator for *Creating an Accessible Campus*, I found it exciting to see the original ideas develop and take shape in the publication you see here.

The Association of Physical Plant Administrators of Universities and Colleges (APPA) has been involved with the issue of campus accessibility for handicapped persons since 1975, when APPA's Executive Board approved the creation of an Ad Hoc Advisory Committee to explore the issue and make recommendations. At that time, a growing number of colleges and universities throughout the United States found that they needed to modify existing facilities to accommodate Vietnam veterans and other members of the handicapped community who were seeking higher education.

The Ad Hoc Advisory Committee, led by Tom Lillis, Director of Physical Plant at Gallaudet College in Washington, D.C., initiated discussions with representatives of the National Center for a Barrier Free Environment regarding APPA's interest in developing cooperative technical support programs. These meetings led to plans to develop a series of seminars on campus accessibility for APPA members in 1977. As work began on the selection of speakers and program topics for the seminars, it became apparent that the Department of Health, Education and Welfare's (HEW's) regulations regarding Section 504 of the Rehabilitation Act of 1973 would play a vital role in the programs. Ultimately, APPA members received seminar announcements within a week after the Secretary of HEW signed the Section 504 regulations.

The seminars formed the basis for this publication and a variety of technical support services provided by APPA. It soon became obvious that a wide range of campus administrators were very interested in the issue, as seminar attendance figures exceeded predictions and surprising numbers of designers and administrators not directly related to the physical plant area enrolled in the seminars. APPA then realized the need for a comprehensive manual or guide to campus accessibility and began offering the seminar workbook for sale to members of the higher education community. The response was overwhelming.

Creating an Accessible Campus grew from this interim publication. It has been made possible through a grant awarded by the Exxon Education Foundation on November 18, 1977. Much of the information presented here is based on sections of the seminar workbook. Updated material and a stringent review process have contributed to this publication, which I hope will make a valuable contribution to both the higher education and handicapped communities. I am proud to offer it to all college and university administrators and to anyone else who is faced with the need to develop facilities that are accessible to handicapped persons.

APPA would like to express appreciation to the members of the Ad Hoc Advisory Committee, editors, authors and regional readers for their participation in the development of this publication. In addition, sincere gratitude is extended to all other individuals who provided valuable input into the drawings, publication format and production of this book.

This publication has been a labor of love for many persons. I have been overwhelmed by the enthusiasm of the authors and reviewers whose comments helped to refine the text. Their input has been a perpetual source of inspiration and assistance to Maggie Coons and Margaret

Milner, who served as editors of *Creating an Accessible Campus*.

To see an idea grow as this one has is a rewarding experience that must be shared by all who have come into contact with the project. As an APPA staff member, I find this project to be doubly rewarding because we achieved a secondary goal of including a large number of members in the publication's development. The goal of involvement is the key to APPA's continued growth and success.

I encourage you to read this publication carefully and use the ideas only after you have studied your campus in detail to determine if the suggestions are applicable to your individual college or university. Please approach this text as a set of recommendations and suggestions for solving accessibility problems, not as a book of arbitrary rules or requirements. I encourage you to contact the authors, the members of the Ad Hoc Advisory Committee, the regional readers or myself in order that we can continue to help you create an accessible campus at your college or university.

Richard W. Anderson, Jr.
Director of Special Programs

Acknowledgements

Advisory Committee:

Representatives of the Association of Physical Plant Administrators of Universities and Colleges (APPA)

Thomas Lillis
Director of Physical Plant
Gallaudet College

John Burnett
Universitywide Coordinator of Physical Plant Operations
University of California

Charles Seaver
Director of Physical Plant
Wright State University

Representatives of the National Center for a Barrier Free Environment

Henry Beasley
Accessibility Coordinator
Gallaudet College

Rita McGaughey
Coordinator of Education and Training
National Easter Seal Society for Crippled Children and Adults

John Lancaster
National Advocacy Director
Paralyzed Veterans of America

APPA Regional Readers:

Central States Region
James Cooper
Director of Physical Plant
University of Texas

Eastern Region
John McFadden
Director of Plant and Property
Iona College

Midwest Region
Ronald Ripley
Assistant Director of Physical Plant
Marquette University

Pacific Coast Region
George Preston
Chief of Plant Operations
Humboldt State University

Rocky Mountain Region
L. Terry Suber
Director of Physical Plant
Colorado State University

Southeastern Region
Henry Barbatti
Director of Physical Plant
University of Tennessee

Editors:

Maggie Coons
Staff Associate/Special Programs
APPA

Margaret Milner
Principal
Research and Editorial Services

Project Management Staff:

Project Administrator
Richard Anderson
Director of Special Programs
APPA

Project Manager
Maggie Coons
Staff Associate/Special Programs
APPA

Staff Assistant
Lois Lieberman
Senior Secretary
APPA

Special appreciation is extended to the following people:

Walter Wade
Director of Physical Plant
Purdue University
APPA President, 1978-1979

Paul Knapp
Executive Director
APPA

Gene Cross
Associate Vice President for Facilities
Kansas State University
APPA Immediate Past President, 1978-1979

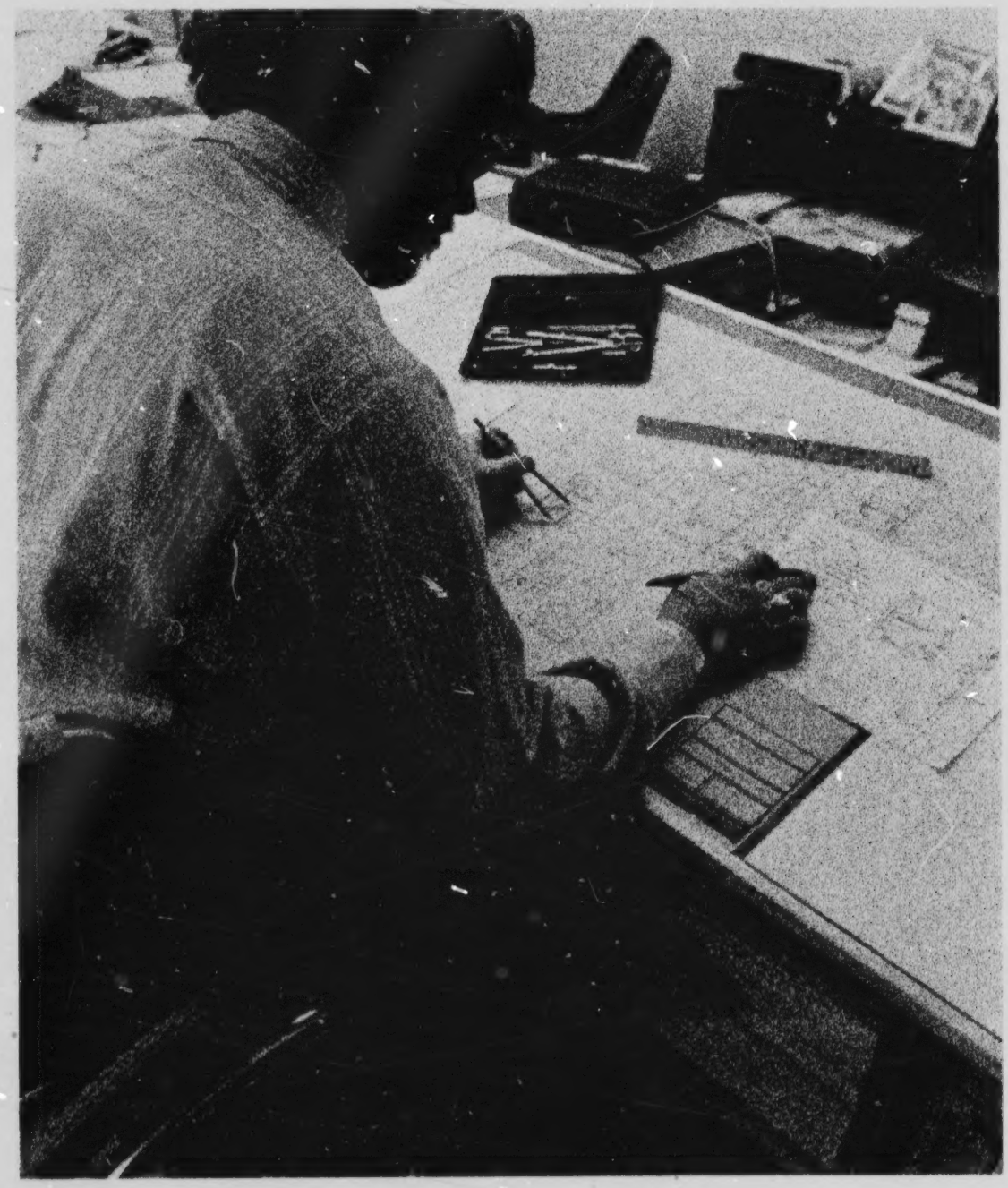
G. Richard Biehl
Director of Information and Publications
National Association of College and University Business Officers

Ronald Mace, AIA
President
Barrier Free Environments, Inc.

Introduction

The Handicapped Building

Edmond Leonard



Introduction

The Handicapped Building

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I don't know how many persons who hate climbing there are in the world; there must be, by and large, a great number. I'm one, I know that. But whenever a building is erected for the use of the public, the convenience of a nonclimbing person is wholly ignored.

I refer, of course, to the debonair habit which architects have of never designing an entrance that is easy to enter. Instead of leaving the entrance on the street level so that a man can walk in, they perch it on a flight of steps, so that no one can get in without climbing . . .

Let us take the situation of a citizen who is not a mountaineering enthusiast. He can command every modern convenience in most of his ways. But if he happens to need a book in the public library what does he find? He finds the same architect has built the thing like a Greek temple. It is mounted on a long flight of steps, because the Greeks were all athletes. He tries the nearest university library. It has a flight that's still longer. He says to himself (at least I do), "Very well, then, I'll buy the damn book." He goes to the bookstores. They haven't it. It is out of stock, out of print. The only available copies are those in the libraries, where they are supposed to be ready for everyone's use, and would be, too, but for the architects and their effete barricades . . .

There's one possible remedy:

No architect who had trouble with his own legs would be so inconsiderate. His trouble is, unfortunately, at the other end. Very well, break his legs. Whenever we citizens engage a new architect to put up a building, let it be stipulated in the contract that the Board of Aldermen shall break his legs first. The only objection I can think of is that his legs would soon get well. In that case, elect some more aldermen and break them again.

Clarence Day
The Crow's Nest

EDMOND J. LEONARD is Program Director and Assistant Executive Director of the President's Committee on Employment of the Handicapped. Since 1962, he has been a member of the secretariat of American National Standards Institute A117.1, the standard for making buildings accessible to the physically handicapped.

When Clarence Day, the American essayist and humorist, wrote the above words in 1921, he was no longer able to climb into libraries, climb up to museums or climb around railway stations. His crippling arthritis was making him less mobile. Yet his heavy-handed solution to his vexing problem reflects not so much an intense frustration at his disability as with his environment. Many of the incapacities we refer to as functional limitations, and which imprison the severely handicapped in a restricted milieu, can be diagnosed as the impact of architectural barriers.

These barriers are constructed or manufactured from design stereotypes that have grown out of tradition, rather than from a critical appraisal of man's needs and responses. North American architecture comes from old Mesopotamia by way of Greece, Tuscany, Rome and Western Europe, and some concepts in general use have origins dating from about 4000 B.C.

The Greek temple, mentioned by Clarence Day, dates back to the middle of the 7th century B.C. Through periods of decline and renaissance, while differences in aesthetic approaches to architecture manifested themselves, the basic concepts relating to entrances and interior facilities prevailed throughout the ages. One does not need to look far around the community to see temples in America functioning as banks, theaters, city halls, civic buildings, churches, university buildings, libraries, museums, even some department stores, and certainly most of our government buildings. During a particularly romantic revival period, even our Southern plantation homes were built according to adaptations of this style.

Breathes there a professor of architecture today who never to his class has said, "Study antiquity!" But the residuals of classical extravagance, where imposing flights of steps may have had a meaning in the symbolism of that age, are largely meaningless in our culture today.

Changing Needs in a Changing World

The fantastic population growth of our urban centers demands adequate provisions for the rapid movement of very large masses of people, particularly provisions for safe entrance and exit in buildings serving the public. Gearing design solutions to the pedestrian pace of ancient cities is archaic. To construct a public building along the lines of a Roman temple or Venetian palace, merely to achieve an element of grandeur, can prove disastrous to many persons who must enter and use the building.

It is only in the present generation that the problem has become aggravated, due ironically to the advances society has made in physical medicine, vocational rehabilitation and selective placement techniques for handicapped persons. We find ourselves with a significant increase in the amount of human potential available for active participation in the world of work.

In ancient Sparta, a congenitally deformed infant was exposed to the elements so that society would not have to cope with his imperfections. He never grew up to define the problem of architectural barriers. They are a modern day phenomena, expanded by the advent of wonder drugs.

During World War I, for instance, the United States suffered 400 paraplegia casualties. One-third of these died in transit back to the United States. Ninety percent died within a few months after hospitilization, and only three lived more than 18 months.

During World War II, when new drugs became available at military centers, there were 2,000

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paraplegic veterans. Ninety percent survived transit back to the United States; more than 1,700 are still alive today, and 80 percent of these are employed. The range of vocational pursuits includes a good proportion in the professions.

In the Vietnam War, of 150,000 American soldiers wounded seriously enough to be hospitalized, about 75,000 were left severely handicapped, and some 25,000 came home totally disabled. About 2,600 are paraplegics.

The Mythical Average Man

It is no longer valid to assume that building design criteria meet the needs of a majority of the population. It is a fallacy and an anachronism to design for persons with average dimensions, average powers, senses, limitations and adaptability. Architects must get used to designing according to the maximum foreseeable performance that will be demanded of a building.

The roof of a house in Chicago is designed to withstand the maximum rainfall — its intensity and duration—as recorded in the rainfall table. A structural engineer in San Francisco takes into account the maximum earthquake on record. The stringent building code around Miami recognizes the maximum velocity of hurricane winds. All facets of construction seem to relate to maximum events or circumstances — the capacity of heating installations, strength of exterior walls, glass thickness and floor loads. Unfortunately, these considerations stop at a point before humans come in contact with the building.

They do not take into account the maximum extremes of those who will be using the building.

So long as architects are influenced by a fabricated fiction known as the "average" man, and so long as this "average" man is forced to represent all of us, architectural barriers are absolutely inevitable. Our buildings become handicapped. And handicapped people, when they interact with such an environment, are met by impediments to their goals for education, travel, work or other activities of daily living.

Clarence Day in his essay puts it succinctly: "There are eminent scholars in universities," he says, "whose strength is taxed daily, because they must daily climb a parapet to get to their studies."

What is needed is a reevaluation of the human characteristics underlying design criteria, taking into account the extremes of performance — the halt and the lame, those who use wheelchairs, crutches and canes, the aging, those with failing sight and diminished hearing.

How many people fall into this wider range of extremes? Statistically, the handicapped person is an elusive figure. He or she has never been systematically counted in a census. Frequently the individual's handicap is invisible. Sometimes it is temporary. The wide range of estimates is confusing because of the lack of uniform definitions among various programs and public agencies. Since even the healthiest possess some imperfections, when do you start counting or stop counting by definition of mild, moderate or severe?

Though judgmental, some attempts have been made to classify the numbers of severely handicapped individuals in the United States. The most striking feature of the following table is that the severe disabilities — those affecting the neuro-muscular, musculoskeletal or sensory functions—are not concentrated among children and youth. They are the endowments of the aging.

Under age 18	180,000
18 through 64	4,200,000
65 and over	3,900,000
Institutional population	1,787,000
Total U.S. population with most severe handicaps	10,067,000

Until fairly recently, not many colleges and universities realized that some of their buildings prevented talented and intelligent students from attaining a higher education. This passivity was shattered abruptly by the urgency of federal regulations that have forced administrators to take a searching look at their facilities. Accessible design is no longer a special solution to an isolated problem; it is a response to a civil right.

Threatening these civil rights are college and university buildings that discriminate against a significant and growing segment of society. As obstacles that thwart access to an adequate education, these campus barriers have been designated as being prejudicial. Even though the prejudice is not intentional, the intensity of its effect has in the past devastated many persons' dreams.

Designing for All People

Accessibility to the built environment for all people can be achieved, with very few exceptions, without the need for special and separate provisions for handicapped persons. Most modifications to achieve accessibility enhance the convenience and safety for everyone.

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The handicapped are not a homogeneous group. Their impairments stem from different causes, manifest themselves in a different manner and affect their functioning in drastically different ways. Their interaction with their surroundings, therefore, tends also to be different, according to the category of disability and degree of severity.

Mobility Barriers

Persons with mobility problems, for instance, have design needs that vary greatly from those with orientation or communication problems. The ability to move with freedom and ease around the environment is a prerequisite to achieving the quality of life everyone desires. It takes little imagination to visualize how not only the handicapped could benefit from improvements in the manmade environment to enhance mobility, but also the entire population.

Any building is, basically, four walls and a roof enclosing space and shutting out the elements, constructed for the use and comfort of people.

But getting inside is only half the battle for persons confined to wheelchairs or with semiambulatory disabilities. If they are to harvest the educational, social, economic and cultural gains contained within the walls of buildings, they must find themselves projected into normal situations, free to make full use of building facilities.

If doorways are too narrow to admit a wheelchair, if thresholds protrude unexpectedly, if not even one toilet room is designed to accommodate wheelchair traffic, if elevators are too cramped or are inaccessible from the entrance level, if public telephone booths are not usable, if abrupt changes in floor level are not offset by gradually sloping ramps, then buildings constructed for the general public can only be classified as contradictions in concrete.

Whether the building works or not for those with mobility limitations is the crucial test. Was it built to be a static work of art, to be viewed and admired from a distance? Or is it a dynamic, living structure, completely functional to every individual who has an interest in entering and using it?

One of the most serious problems for the nonambulatory is that of achieving vertical movement. Traditionally, rather restrictive solutions have been in vogue to overcome the problem—providing elevators, escalators and ramps.

Elevators are easy to use for almost all persons; however, even when elevators are available, controls and signaling devices are not always within easy reach. The blind cannot always detect which button to push; fingers fumbling on controls may activate heat sensors. Some people have a morbid fear of mechanical breakdowns.

The escalator, while a solution to the level change problem for some, is a new barrier for others. According to a study published by the Department of Transportation, at least 25 percent of physically handicapped persons have difficulty using a typical escalator.

This same study notes also that ramps, while a good solution for persons in wheelchairs, can be difficult to use or even hazardous for persons on crutches.

Accommodating Sight Impairments

Persons probably most affected by problems of orientation are those with severe eyesight disabilities. The severely visually impaired are generally comfortable in familiar environments. A study some years ago, however, showed that more than half the blind population observed

spent three or more hours per week in unguided and unfamiliar routes.

There are several ways to make orientation easier for such persons. A cane or stick will not detect dangerous obstacles and objects that are hanging or projecting above their reach. Pedestrian circulation routes should be kept clear of furniture or fixtures to avoid collisions. Where possible, pedestrian traffic in opposite directions should be divided, particularly at busy entrances and exits. Lampposts, parking meters and posts should never interfere with the pedestrian walk way.

One can warn against unavoidable obstacles by varying floor surface materials, or by using safety fences or rails. This is particularly important in construction or repair sites, where the sidewalk may be closed off and pedestrians are detoured. Any barricade should be designed to permit safe directional guidance for the blind, making use if possible of audio signals.

Light is of great importance both to people with poor eyesight and to those with varying degrees of vision. Suitable lighting schemes, in combination with the right materials and choice of colors, can make visual orientation easier. Contrasting color schemes can facilitate safe orientation to a room and its parts, long corridors, or the first and last step on flights of stairs.

Snow is a particular problem. Not only can it cover and hide curbs, for instance, but it can

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deaden sound — probably the most important sense in orientation of blind persons. Sound can have both a positive and negative effect. It can act as a complement to other orientation signals, such as the sound of an escalator, a fountain or the flow of traffic. When it is distorted by wind, porous walls, thick carpeting or echoes, then desirable noises that are recognized as directional signals become muted or blocked out.

Unfortunately, most of our environmental communication system relies upon visual information rather than tactile messages. Controls are an exception; they are physical, and thus, touchable. However, location is the single most recurring problem. In the case of blindness, controls must be within arm's reach in order to find them. Controls, particularly on elevators, ought to have the most legible graphics possible and a tactile backup next to them. It is better to stick with raised Arabic numerals, rather than use braille numerals; estimates of the number of blind people capable of reading braille range from a low of 5 percent to a high of 20 percent.

Environments for the Deaf

Simply stated, there is one thing that must be kept in mind to create sympathetic environments for persons with deafness. Basically, their environment must offer maximum safety and convenience through the senses of vision, touch, smell and taste since these persons have little or no hearing ability. Vision is the sense most relied upon to maintain contact.

Deafness manifests itself as a communication handicap. Audio communication systems, such as telephones, intercoms, alarms and audio paging systems, are of little use to people with deafness unless accompanied by visual or other sensory information. Deaf people do not seek out verbal information. Therefore, public facilities, directional routes and areas within buildings should be clearly identified by signs or symbols, clearly communicated circulation paths, lighting and other visual information.

Where deafness is accompanied by inner ear damage, the sense of balance may be impaired. Handrails or guardrails at potentially hazardous drop-off areas are therefore almost as relevant for the deaf as for the blind.

Public service areas such as water fountains, rest rooms, coat rooms and the like should be located near the central circulation and information hub of public buildings. They should be immediately visible or be indicated by clear directional signage.

One area where deaf persons employ their sense of touch is through their awareness of contact with the ground as they walk. Unlike hearing persons, who can depend upon the sound of their own footsteps to maintain psychological stability, deaf persons like hard, durable, nonslip floor coverings in circulation areas. These floors — wood, linoleum or tile — are suited also to the needs of those with mobility problems or with visual impairments. In spaces such as classrooms, however, carpeted floors improve acoustic qualities for hearing impaired people by absorbing ambient noise.

Because audio signals indicating the arrival of elevator cabs will not attract the attention of deaf persons, visual arrival signals would be helpful. These should be in direct line of sight, preferably above or beside elevator doors, and they should indicate whether the elevator is moving up or down. Because visual signals may not reach a deaf person instantaneously, it would be ap-

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propriate to allow more time for passengers to board after the door opens.

Alarm systems constitute the most trying communication problem for the deaf, who cannot be alerted by audio fire and emergency alarms. Clearly they need some additional system, either visual or tactile. Visual alarms, however, do not send out messages in all directions, as do audio alarms. They require close proximity or direct line of sight with visual stimulus to arouse the deaf person, thus posing serious logistical problems.

A popular misconception of deafness is that deaf people can tolerate a high volume of noise and thus are quite comfortable in a noisy atmosphere. Most people with deafness have some residual hearing, and many wear hearing aids for amplification of sound. The problem is that hearing aids not only amplify communications, but also pick up extraneous background noises. This competing sound may come through strong enough to drown out the communicative sound. To minimize noise interference, hearing aids need a setting that can provide sound isolation and sound absorption.

Correcting the Handicap

Handicapped buildings can be corrected with intelligent planning. All persons involved in the planning process must take advantage of a significant coming event — the report that in the next forty years as much construction will take place in the United States as has occurred since the arrival of Christopher Columbus. Planners and designers must seek a constructive change in the traditional view of architectural design, so that these buildings will be constructed for the use of all.

The moral for all of us to recognize is that what we do today will help to shape tomorrow's world. And the world we hope for is one which is not necessarily molded for the perfect, but one in which any person, despite a physical handicap, can move about with grace and dignity.

After all, we do not want to see the situation on college and university campuses degenerate to Clarence Day's suggestion: "We let in the brainless without any examination at all, and shut out the most scholarly persons unless they have legs like an antelope's."

Chapter 1

Program Accessibility and Section 504

Maggie Coons
and G. Richard Biehl

Program Accessibility and Section 504

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MAGGIE COONS, APPA Staff Associate/Special Programs, has written newsletter articles and a speech on the Section 504 regulations. She is a member of the HEATH (Higher Education and the Handicapped) Project Task Force and the Task Force on Life Safety and the Handicapped.

G. RICHARD BIEHL is Director of Information and Publications for the National Association of College and University Business Officers (NACUBO). He wrote the Guide to the Section 504 Self-Evaluation for Colleges and Universities *published by NACUBO and* NACUBO Special Report #77–6, *"HEW Issues Final Rules for the Handicapped" as part of the HEATH project. He also wrote a chapter of* Federal Regulations and the Employment Practices of Colleges and Universities.

Section 504 of the Rehabilitation Act of 1973 [Public Law 93-112], as amended [Public Law 93-516], states: "No otherwise handicapped individual in the United States . . . shall solely by reason of handicap, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."

The Department of Health, Education and Welfare's (HEW's) Office for Civil Rights (OCR) issued the regulations for implementing Section 504 that affect most colleges and universities. The regulations were published in the *Federal Register* on May 4, 1977. Section 504 is a civil rights statute, mandating "nondiscrimination," *not* affirmative action. It requires no goals or timetables related to the number of handicapped persons in the student population or work force.

HEW's regulations mandate that all recipients of HEW financial assistance must provide equal opportunity for qualified handicapped persons in their programs and activities. By prohibiting discrimination on the basis of handicap, Section 504 obligates colleges, universities and other recipients of federal funds to make certain adjustments and accommodations. It also offers to handicapped persons the opportunity to participate fully in all educational programs and activities.

Who Is Covered by Section 504?

Section 504 applies to all "recipients" of "federal financial assistance." A "recipient," as defined by HEW, is "any state or its political subdivision, any instrumentality of a state or its political subdivision, any public or private agency, institution, organization or other entity, or any person to which federal financial assistance is extended

directly or through another recipient, but excluding the ultimate beneficiary of that assistance."

"Federal financial assistance," as defined by HEW, is "any grant, loan, contract (other than a procurement contract or a contract of insurance or guaranty) or any other arrangement by which the Department (HEW) provides or otherwise makes available assistance in the form of:

- funds
- services of federal personnel
- real and personal property or any interest or use of such property . . ."

Since HEW interprets this definition of "federal financial assistance" to include student aid and veterans assistance programs, virtually every college and university in the United States is covered by Section 504.

Key Terms and Definitions

An understanding of key terms of the Section 504 regulations is essential to successful compliance. Some key terms are defined in this section.

A *facility*, as defined in Section 504, means all or any portion of buildings, structures, equipment, roads, walks, parking lots, or other real or personal property or interest in such property.

A *handicapped person*, as defined in Section 504, is any person who:

1. has a physical or mental impairment which substantially limits one or more major life activities (functions such as caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning and working);

2. has a record of such an impairment (has a history of, or has been misclassified as having, a mental or physical impairment that substantially limits one or more major life activities); or

3. is regarded as having such an impairment. A person may be included in this definition if he or she:

   a. has a physical or mental impairment that does not substantially limit major life activities but is treated by the institution as though such a limitation exists;

   b. has a physical or mental impairment that substantially limits major life activities only as a result of the attitudes of others toward such an impairment; or

   c. has none of the impairments defined under "physical or mental impairment," but is treated by the institution as having such an impairment.

Condition 1 above includes only physical and mental handicaps. Therefore, environmental, cultural and economic disadvantages are not in themselves covered; nor are prison records, age or homosexuality. Of course, if a person has any of these characteristics and also has a physical or mental handicap, he or she is included within the definition of "handicapped persons."

Condition 2 includes persons who have a history of a handicapping condition (e.g. mental or emotional illness, heart disease or cancer) but no longer have the condition, and persons who have been incorrectly classified as having such a condition (e.g. mentally retarded).

Condition 3 protects persons who are ordinarily considered to be handicapped but do not fall within the first two parts of the statutory definition, such as persons with a limp. This part of the

definition also includes some persons who might not ordinarily be considered handicapped, such as persons with disfiguring scars or persons who have no impairment but are treated as if they are handicapped.

Physical or mental impairment, as defined in Section 504, means:

1. any physiological disorder or condition, cosmetic disfigurement or anatomical loss affecting one or more of the following body systems: neurological; musculoskeletal; special sense organs; respiratory, including speech organs; cardiovascular; reproductive; digestive; genitourinary; hemic and lymphatic; skin; and endocrine; or

2. any mental or psychological disorder, such as mental retardation, organic brain syndrome, emotional or mental illness and specific learning disabilities.

A physical or mental impairment does not constitute a handicap for purposes of Section 504 unless it results in a substantial limitation of one or more major life activities. The term "physical or mental impairment" is not defined by virtue of a listing of specific diseases and conditions due to the difficulty of ensuring the completeness of such a list. However, this term is intended to encompass such diseases and conditions as orthopedic, visual, speech and hearing impairments; cerebral palsy; epilepsy; muscular dystrophy; multiple sclerosis; cancer; heart disease; diabetes; mental retardation; emotional illness; drug addiction and alcoholism. "Specific learning disabilities" are included in the definition of "mental impairment," and the term is intended to describe such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia.

A *qualified handicapped person,* as defined in Section 504, means:

1. with respect to employment, a handicapped person who, with reasonable accomodation, can perform the essential functions of the job in question; and

2. with respect to postsecondary and vocational education, a handicapped person who meets the academic and technical standards requisite to admission or participation in the recipient's education programs or activity.

Program Accessibility

"Program accessibility" is the key term in Section 504. Programs and activities must be accessible if discrimination is to be eliminated and handicapped persons are to be afforded equal opportunities for full participation. With regard to program accessibility, it is important to highlight five major principles contained in Section 504.

1. It is important to distinguish between the concept of *program accessibility* and that of a *barrier-free environment.* Section 504 requires program accessibility; that is, all programs and activities of an institution, when viewed in their entirety, must be accessible to handicapped persons. Achieving program accessibility will no doubt require some modifications to an institution's existing facilities. However, *structural changes are required only when there is no other feasible way to make a program or activity accessible.*

A barrier-free environment, on the other hand, has *no* physical barriers to access by handicapped persons. *Section 504 does not require a barrier-free environment in existing facilities; it requires that programs and activities, when viewed in their entirety, be accessible.* All existing facilities need not

be made accessible, so long as an institution's programs and activities, as a whole, are accessible. This flexible approach allows institutions to achieve full participation for handicapped persons without renovating every existing classroom building and dormitory.

Section 504 does require that all new construction started after June 3, 1977 be free of barriers. Alterations of existing facilities that affect, or could affect, usability by handicapped persons must result in the facility being "readily accessible to and usable by handicapped persons."

2. Handicapped persons or organizations representing handicapped persons shall be involved in the planning process for achieving program accessibility. Handicapped persons, having personally experienced barriers to full participation, can be a valuable resource to the identification of inaccessible programs and facilities. Contributions of handicapped persons can also be useful in ordering institutional priorities for modification or elimination of barriers.

3. Making programs and activities accessible to the handicapped students and employees on a particular campus will make it necessary to become familiar with general accessibility standards *and* to ascertain what, if anything, each individual requires in order to modify or eliminate barriers to full participation.

4. Recipients of federal financial assistance may not provide *separate* or *different* aid, benefits or services to handicapped persons unless such action is necessary to provide qualified handicapped persons with aid, benefits or services that are as effective as those provided to others. When there is more than one option in the decision-making process, the option selected for implementation shall be the one that will result in the *most integrated setting appropriate* for handicapped persons. Section 504 places obligations on the institution, not on the handicapped person. Where separate programs or activities must exist, handicapped persons must always have the option to participate in those programs or activities that are not separate or different.

5. Regular and open communication (and formal grievance procedures) must be established so that information on program accessibility will be shared on an ongoing basis. Communication should be designed so that it will reach all members of the campus community, including the blind and the deaf.

When achieving program accessibility, it will be important to consider the range and variety of handicaps (Chapters 3 and 5 describe the various types of handicaps.). In certain cases, achieving accessibility may require making program changes or physical modifications that serve not only the current students and employees of an institution, but also prospective students and employees. For example, an institution's admissions facilities need to be accessible to persons with mobility impairments so that such applicants will have equal admissions opportunities.

General Provisions

According to Section 504, colleges and universities, in providing any aid, benefit or service, either directly or through any contractual, licensing or other arrangement, *may not:*

1. deny a qualified handicapped person the opportunity to participate in or benefit from the aid, benefit or service;

2. afford a qualified handicapped person an opportunity to participate in or benefit from the aid, benefit or service that is not equal to that afforded others;

3. provide a qualified handicapped person with an aid, benefit or service that is not as effective as that provided to others;

4. provide different or separate aid, benefits or services to handicapped persons or to any class of handicapped persons unless such action is necessary to provide qualified handicapped persons with aid, benefits or services that are as effective as those provided to others;

5. aid or perpetuate discrimination against a qualified handicapped person by providing significant assistance to an agency, organization or person that discriminates on the basis of handicap in providing any aid, benefit or service to beneficiaries of the institution's program;

6. deny a qualified handicapped person the opportunity to participate as a member of planning or advisory boards; or

7. otherwise limit a qualified handicapped person in the enjoyment of any right, privilege, advantage or opportunity enjoyed by others receiving an aid, benefit or service.

Four additional requirements or points of clarification are necessary with regard to the above prohibitions. First, in order to be "equally effective," as this term applies in conditions 3 and 4 above, an aid, benefit or service need not produce the identical result or level of achievement for handicapped and nonhandicapped persons. In order to meet the requirements of any handicapped person in his or her pursuit of full participation, adjustments to regular programs or the provision of different programs may be necessary. To be "equally effective," an aid, benefit or service must afford handicapped persons an equal opportunity to obtain the same results, to gain equivalent benefits or to reach the same level of achievement as nonhandicapped persons, in the most integrated setting appropriate to the person's needs.

Second, as used above, the "aid, benefit or service" provided under a program or activity includes any aid, benefit or service provided in or through a facility that has been constructed, expanded, altered, leased or rented, or otherwise acquired, in whole or in part, with federal financial assistance.

Third, even if "separate" or "different" programs or activities are offered, as those terms are used in condition 4 above, colleges and universities may not deny a qualified person the opportunity to participate in such programs or activities that are not separate or different.

Fourth, in determining the "significance" of an institution's assistance to such organizations, as referred to in condition 5 above, the institution needs to analyze the substantiality of its relationship to each such group or individual. Criteria to be considered *include* financial support by the institution and whether the activities of the group in question relate so closely to those of the institution that they should fairly be considered activities of the college or university itself. This prohibition against supporting "outside" organizations or persons may necessitate an analysis by the institution of all external relationships that it has (and plans to continue).

Outside organizations or persons to which an institution provides significant assistance may include labor unions or other organizations representing or serving employees; providers of insurance or other employee benefits; and social, recreational or other organizations that provide programs or activities to students or employees, including fraternities, sororities and other student groups. In making certain that discrimination does not exist in an outside organization's

programs or activities, the institution needs to make its policies and practices regarding nondiscrimination clear to such organizations and persons.

This principle of "significant assistance" is worded the same as that applied to similar circumstances in regulations implementing Title IX of the Education Amendments of 1972, as amended. In complying with Title IX, many institutions sought written assurances from such organizations and persons that they do not discriminate on the basis of sex; and, through whatever procedures may be necessary, made certain that the programs and activities of such organizations and persons did not, in fact, discriminate against the group in question.

Section 504 Deadlines

Section 504 requirements and deadlines are summarized in Fig. 1.

By December 2, 1977, institutions were to have completed a transition plan that, at a minimum:

- identified physical obstacles that limit accessibility
- described in detail the methods that will be used to make facilities accessible
- specified the yearly schedule for completion, by June 3, 1980, of steps necessary to achieve full program accessibility
- indicated the person responsible for implementation of the plan

Fig. 1 Deadlines for Section 504 requirements

Requirements	Deadline
1. Complying with specific requirements, including but not limited to:	June 3, 1977
a. appointing responsible person(s) to coordinate efforts	
b. adopting grievance procedures	
c. ensuring that new construction conforms to ANSI standard A117.1	
d. ensuring that auxiliary aids are available in the classroom	
2. Submitting to HEW an assurance pledging compliance with the requirements	July 5, 1977
3. Making programs and activities accessible, with the exception of structural modifications that may be required.	August 2, 1977
4. Making initial notifications regarding the institution's commitment to nondiscrimination	September 2, 1977
5. Completing a transition plan for changes in facilities needed to achieve accessibility	December 2, 1977
6. Completing an institutional self-evaluation	June 3, 1978
7. Completion of modifications in facilities in order to achieve physical accessibility, as outlined in the transition plan.	June 3, 1980

The transition plan was not required to be submitted to HEW, but must be available for public inspection or submission to HEW on request.

In cases where alteration or construction is not necessary to achieve program accessibility (e.g., through actions such as the rescheduling of classes), such programs and activities were to have been accessible on August 2, 1977. In cases where alteration is necessary, June 3, 1980 is the deadline for achieving program accessibility. HEW has cautioned colleges and universities that the June 3, 1980 deadline should not delay the tasks of making programs and activities accessible as expeditiously as possible, particularly in cases where relatively minor renovations (such as ramps or curb cuts) would result in accessibility.

It is important that an institution document its efforts to achieve program accessibility by June 3, 1980. HEW has stated that, since the flexible standard permits institutions to devise ways to make their programs accessible without extremely expensive or impractical physical changes, *there is no provision that allows for waivers of the program accessibility requirements.*

Enforcement

Section 504 is enforced in institutions of higher education by HEW's Office for Civil Rights (OCR). Until OCR develops a consolidated enforcement procedure, it will be using the procedures it currently employs to enforce Title VI of the Civil Rights Act of 1964. These Title VI procedures are incorporated by reference in the final regulations issued under Section 504 and have been reprinted along with Section 504 regulations in materials distributed by HEW. They are available from the national and regional offices of OCR.

Executive Order 11914, signed on April 28, 1976, empowered the Secretary of HEW to coordinate the implementation and enforcement of Section 504 by other federal agencies. All agencies that provide federal financial assistance will be issuing rules and directives consistent with the standards and procedures established by HEW.

Section 3(b) of Executive Order 11914 provides that if voluntary compliance cannot be secured by informal means, compliance with Section 504 may be achieved by the suspension or termination of, or refusal to award or continue, federal financial assistance, or by other appropriate means authorized by law, in accordance with standards and procedures established pursuant to this order.

OCR will be issuing a series of rulings on Section 504 in the *Federal Register*. These rulings should provide policy guidance on previously unaddressed issues related to Section 504. Institutions are urged to monitor the *Federal Register* for such rulings or any changes in the regulations.

A college or university may be required to take *remedial action* if the Director of OCR finds that there has been discrimination on the basis of handicap in violation of Section 504. Such actions may be required in order to overcome the past effects of discrimination, and they may pertain to handicapped persons who:

- are no longer participants in the institution's programs and activities but were when the discrimination occured; or
- would have been participants in the program had the discrimination not occured.

An institution would only take remedial action at the request of the Director of OCR.

A college or university may take *voluntary action* in order to overcome the effects of conditions that resulted in limited participation in programs or activities by qualified handicapped persons. Institutions should not be reluctant to take voluntary action for fear of reprisals. Voluntary action need not involve an admission of past discriminatory practices, but may be viewed as a good faith effort to remove previous limitations on opportunities.

Special provisions of Section 504 exist for colleges and universities that are taking remedial or voluntary action under Section 504.

The Role of Facilities in Program Accessibility

General Requirements

A recipient shall operate each program or activity so that the program or activity, when viewed in its entirety, is readily accessible to handicapped persons. This does not require a recipient to make each of its existing facilities or every part of a facility accessible to and usable by handicapped persons. However, it may require some modifications to existing facilities.

It should be remembered that the term "facility," as defined in Section 504, includes all or any portion of buildings, structures, equipment, roads, walks, parking lots, or other real or personal property or interest in such property. Chapter 5 contains specific information regarding standards that relate to many of these areas.

Existing Facilities

The regulations require that each program or activity operated by the institution be readily accessible to handicapped persons when it is viewed in its entirety. Therefore, every facility (or every part of every facility) need not be accessible to and usable by handicapped persons. Handicapped persons must have equal opportunities to achieve full participation in all programs and activities, but full participation does not necessarily mandate massive renovation or construction efforts.

An institution is not required to make structural changes in existing facilities where other methods are effective in achieving program accessibility. Therefore, facilities need not be renovated when any of the following actions (or similar types of actions) are successful in ensuring full participation for handicapped persons in programs and activities:

- redesign of equipment
- reassignment of classes or other services to accessible buildings
- assignment of aides to handicapped persons
- home visits
- delivery of health, welfare or other social services at an alternate accessible site

The Section 504 regulations are flexible, allowing institutions to determine for themselves, in consultation with handicapped students and employees or organizations representing handicapped persons, the most effective means of achieving program accessibility. As an example of an approach that may be permitted to achieve accessibility, HEW has stated that water fountains may be made accessible to persons in wheelchairs by installing paper cup dispensers within reach of persons who are in wheelchairs.

As the institution formalizes plans for achieving program accessibility, it should compare the life cycle cost of facility renovation with other means of achieving program accessibility, such as pro-

viding assistants to retrieve books in the library, which may involve ongoing annual costs.

As the institution selects among options for achieving program accessibility — options that certainly include renovation of existing facilities or the construction of new ones — it is required that priority be given to those options that offer programs and activities to handicapped persons "in the most integrated setting appropriate." This firm requirement in the regulations does not necessarily lead to an environment that is any more or less barrier-free. At the risk of generalizing, persons who are blind or deaf may consider existing facilities satisfactory in their pursuit of full participation, with few or no changes made to remove physical barriers. On the other hand, persons with mobility impairments may require certain facility renovations in order to have opportunities that are equal to those of persons who are not mobility impaired. In the context of facility renovation, "the most integrated setting appropriate" for any handicapped person will be the one that places his or her actions and activities most clearly in the mainstream of those of nonhandicapped persons.

The institution must adopt and implement procedures to ensure that interested persons, including those with sight and hearing impairments, can obtain information regarding the existence and location of services, activities and facilities that are accessible to and usable by handicapped persons. As part of this effort, the institution may wish to alert its employees and students to general accessibility standards, such as those related to parking lots and water fountains, so that they may report problem areas to the appropriate campus official. Through such an ongoing communications process, an institution may be more responsive to the accessibility requirements of handicapped persons based on its experiences with Section 504.

New Construction

Beginning June 3, 1977, all new construction and alterations that affect usability are to be carried out according to standards that ensure accessibility to and usability by handicapped persons. These requirements pertain to facilities (or parts of facilities) that are constructed or altered by, on behalf of, or for the use of colleges and universities. Any alterations that could affect the usability of the facility, or part of the facility, shall, to the maximum extent feasible, be made in a manner that makes the altered portion of the facility readily accessible to and usable by handicapped persons. For example, if a doorway is being altered, the door opening must be wide enough to accommodate wheelchairs.

The phrase "maximum extent feasible" is intended to cover cases in which the nature of the facility is such as to make it impractical or prohibitively expensive to renovate in a manner that results in a completely accessible alteration. In such cases, however, the maximum physical accessibility feasible should be the objective.

Standards to be followed in construction or alteration are those of the American National Standards Institute (ANSI). ANSI A117.1 includes precise specifications designed to ensure that handicapped persons will have access to and be able to use facilities. Among areas included in the ANSI standard are entrances, doors, stairways, parking, elevators, walkways, floors, ramps, toilet rooms, warning signals, hazards, water fountains, light switches and other controls, and telephones. Departures from the ANSI standard are permitted, but only when it is clearly evident that equivalent or greater access is provided. The current ANSI A117.1, which is being revised, is available for $2.75, with checks payable to ANSI, 1430 Broadway, New York, New York 10018.

Student Programs, Activities and Services

Section 504 prohibits discrimination against qualified handicapped students in any programs or activities of the institution. Some of the major programs and activities are summarized below, with particular emphasis on requirements dealing with facilities.

Admissions and Recruitment

Qualified handicapped persons may not be denied admission or be subjected to discrimination in admission or recruitment on the basis of handicap. Freeing admission and recruitment policies and procedures of discrimination based on handicap is essential to ensuring full participation by handicapped persons. Quite obviously, discriminatory obstacles to a person's admission not only limit participation, but they may also ensure that there will be no participation in an institution's programs and activities. Also, since admissions and recruitment activities are often a student's first exposure to the institution, the degree of discrimination present in these processes may set the tone for an individual's ensuing educational experience. A qualified handicapped student's sense of community or involvement may be severely compromised if he or she had to overcome unnecessary obstacles in the admissions process.

Academic Programs and Adjustments

The regulations state that colleges and universities must make such modifications to their academic requirements as are necessary to ensure that such requirements do not discriminate, or have the effect of discriminating, on the basis of handicap against a qualified handicapped applicant or student. Academic requirements that the institution can demonstrate are essential to the program of instruction being pursued by such student or to any directly related licensing requirement will not be regarded as discriminatory, even if they have an adverse effect on persons with handicaps. Modifications may include changes in the length of time permitted for the completion of degree requirements, substitution of specific courses required for the completion of degree requirements and adaptation of the manner in which specific courses are conducted.

Unless academic requirements are demonstrated to be essential to the program of instruction in question or directly related to some licensing requirement, they must provide no barriers to equal opportunity and full participation for handicapped persons. In order to ensure that no discrimination exists in academic requirements, courses of study or individual courses, institutions may wish to review all graduation requirements; all policies or guidelines regarding procedures for assigning students to courses or classes; course descriptions and catalogs; curriculum guides that outline the content, activities and instructional methodologies of courses; and student handbooks.

Under program accessibility requirements, rescheduling classes is one option that may be used to achieve accessibility without making structural modifications. It should be noted that institutions that are able to schedule classes based on preregistration information will eliminate many tasks related to rescheduling, providing they are aware of accessibility requirements of individual handicapped persons (*not* classes of handicapped persons) in their student body. All existing classrooms of the institution do not have to be accessible, but a sufficient number must be accessible so that, through advance scheduling or rescheduling, handicapped students are not limited in their selection of courses.

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Depending upon the number of handicapped students on a campus, or in a particular program, it is suggested that all required courses and a reasonable selection of electives be offered in accessible classrooms, in order to avoid unnecessary rescheduling complications. A college or university may not exclude a handicapped student from any specifically requested course offering once the three-year transition period for structural modifications, ending June 3, 1980, has expired. The flexible program accessibility standard, however, should permit institutions to make many courses accessible well in advance of that date. For courses that have more than one section, there is no requirement that more than one section be accessible. However, institutions would violate the "most integrated setting appropriate" principle if all handicapped students (not merely those with mobility impairments) were scheduled for the same section.

Auxiliary Aids

The regulations state that the institution shall provide appropriate auxiliary aids to persons with impaired sensory, manual or speaking skills, where necessary to afford such persons an equal opportunity to benefit from the service in question. Auxiliary aids may include brailled and typed material; interpreters or other aids for persons with hearing impairments; readers in libraries for students with visual impairments; classroom equipment adapted for use by students with manual impairments; and other similar services and actions. Chapter 8 describes some of the instructional aids now available for classroom use.

Colleges and universities need not provide personal attendants, individually prescribed devices, readers for personal use or study, or other devices or services of a personal nature.

Housing

The HEW regulations prohibit discrimination on the basis of handicap in all housing programs operated by or assisted by the college or university. They state that any institution that provides housing to nonhandicapped students shall provide comparable, convenient and accessible housing to handicapped students at the same cost as to others. (The terms "comparable" and "convenient" are not defined in the regulations or other Section 504 literature.) At the end of the three-year transition period for facilities renovation and construction, housing shall be available in sufficient quantity and variety so that the scope of handicapped students' choice of living accommodations is, as a whole, comparable to that of nonhandicapped students.

"As a whole," as in other parts of Section 504, means that the program, when viewed in its entirety, must be accessible to handicapped persons. It does not mean that every aspect of the program must be accessible, so long as opportunities for full participation are not limited. Every dormitory room need not be accessible, but a reasonable selection of living arrangements must be available to the handicapped student.

The three-year transition period need not delay the task of providing to certain classes of handicapped students housing accommodations of the same variety and scope that are enjoyed by nonhandicapped students. In fact, many accommodations and modifications in the housing area, whether in facilities or in housing policies, may be oriented toward meeting the requirements for full participation of persons with mobility impairments. It is important to remember that no separate or different programs and treatment are permitted by Section 504 unless they are necessary to ensure full participation. Also, if separate or different programs do exist, a

handicapped person's option to participate in programs that are not separate or different must always be preserved.

In its effort to provide comparable, convenient and accessible housing to handicapped students, the institution will need to analyze its present offering of rooms and determine, with the assistance of handicapped students or their representatives, what would comprise a reasonable selection of accessible rooms. The number of rooms that must be made accessible will, of course, depend upon the number of handicapped students enrolled (and projected for future enrollment) who require accessible rooms. There is no easy formula that may be used for this computation.

Section 504 states that an institution that assists outside agencies, organizations or persons in making housing available to students shall take such action as may be necessary to assure itself that such housing is, "as a whole," made available in a manner that does not result in discrimination on the basis of handicap. It should be remembered that the "as a whole" concept does not require that all off-campus housing be accessible to handicapped persons and administered without discrimination. Rather, it requires that procedures be developed and implemented that will ensure a reasonable selection of off-campus accommodations for handicapped persons.

One final issue related to housing may present some colleges and universities with complicated legal questions. Section 504 takes precedence over any state or local law or regulation that, on the basis of handicap, imposes prohibitions or limits upon the eligibility of qualified handicapped persons to receive services. However, in certain states and localities, laws and orders may prohibit the housing of certain classes of handicapped persons in certain parts of facilities. For example, it may be a violation of a local fire ordinance to house persons with mobility impairments above the first floor. However, providing persons that have mobility impairments with a comparable selection of housing may, under Section 504, require that some rooms accessible to such persons be on the fourteenth floor.

Colleges and universities should determine which, if any, state or local laws are in conflict with Section 504, and determine, in consultation with informed legal counsel, the appropriate path of action. At odds in this particular case would be the principle of housing students "in the most integrated setting appropriate," as espoused by HEW, and the principle of taking extra precautions to protect the lives of students, as argued by the local fire marshal. Such conflicts need to be resolved in future rulings of HEW.

Other Laws, Codes and Standards

Section 503 of the Rehabilitation Act of 1973, as amended, deals with affirmative action obligations of federal (sub)contractors to employ and advance in employment qualified handicapped persons. This companion to Section 504 in the 1973 legislation, administered by the Labor Department's Office of Federal Contract Compliance Programs (OFCCP), involves only employment matters and is applicable only to federal (sub)contractors with one or more (sub)contract(s) of $2,500 or more; *Section 504 requirements apply to all recipients of federal financial assistance, in any form, and involve all recipients' programs and activities, including employment.*

There are some similarities between the provisions for nondiscrimination in employment in Sections 503 and 504. In fact, institutions that are already in compliance with Section 503 may be

satisfying some of the Section 504 prohibibitions against discrimination in employment. It should be remembered, however, that Section 503 requires affirmative steps, beyond nondiscrimination, to employ and advance in employment qualified handicapped persons.

Section 502 of the Rehabilitation Act of 1973, as amended, established the Architectural and Transportation Barriers Compliance Board and that board's authority to ensure compliance with the Architectural Barriers Act of 1968, as amended. This statute has significant implications for facilities built with federal construction funds after September 2, 1969. Such buildings and facilities, referred to as "502 buildings," are to be constructed (and since September 2, 1969 were to have been constructed) in strict conformance with ANSI standards that ensure an absence of physical barriers for handicapped persons.

All *new* construction on college and university campuses must be in conformance with ANSI A117.1 as a result of Section 504. However, as a result of the Architectural Barriers Act, this requirement dates back to September 2, 1969 for all construction funded with federal construction assistance. For institutions that have buildings that have been constructed since September 2, 1969 with federal support, it is important to make certain that such facilities are consistent with ANSI and, if they are not, that immediate efforts be initiated to ensure that they are in compliance. For such buildings there is no waiting period for compliance; they were to have been in compliance from the outset.

Much of the wording that appears in the Section 504 regulations is parallel to (or the same as) the wording of rules implementing Title IX of the Education Amendments of 1972, as amended, prohibiting sex discrimination in education programs and activities. There are also many similarities to the language of the rules implementing Title VI of the Civil Rights Act of 1964, prohibiting discrimination based on race, color or national origin in education programs and activities. As indicated earlier, enforcement procedures for Title VI have been adopted for temporary use in Section 504.

Due to these similarities in language and emphasis, many colleges and universities have sought to combine certain procedures or programs related to these nondiscrimination statutes. The institution's statement of commitment to nondiscrimination and statements that appear in advertisements, catalogs and other printed materials and communications of the institution may contain joint references to nondiscrimination prohibitions. Grievance procedures are another area in which combining two or more programs may be effective for a particular college or university. Other areas related to the institution's nondiscrimination programs should be explored to ascertain whether savings can be made and duplication of effort avoided.

Section 504, as a "nondiscrimination" statute, prohibits discrimination against existing employees, students and applicants for employment or admission. In practice, Section 504 requires something between what is ordinarily defined as "affirmative action" and "nondiscrimination," since, in the process of ensuring nondiscrimination, it requires certain actions beyond mere neutrality to be taken regardless of the presence of handicapped persons who might benefit. This principle of advance preparation to ensure nondiscrimination appears to go beyond the traditional concept of laissez faire nondiscrimination.

Section 504 implies that all states must comply with ANSI A117.1 or establish regulations that

are more stringent. Other standards may be used only if they result in equal or better accessibility for handicapped individuals. Before completing plans for compliance with Section 504, colleges and universities should investigate all state and local codes and statutes relating to nondiscrimination and handicapped accessibility. These would include fire codes, insurance regulations and building codes. Conflicts may arise, also, when simultaneously trying to comply with Section 504 regulations, the Occupational Safety and Health Act and National Fire Protection Association guidelines.

This points up the necessity to utilize a variety of resources on accessible design and to approach each problem with an understanding of the design rationale in order to develop creative solutions that will satisfy the requirements of the various standards, codes and regulations that may apply in a given situation.

For more information concerning Section 504 requirements, consult the *Guide to the Section 504 Self-Evaluation for Colleges and Universities*, produced by the National Association of College and University Business Officers. This publication, copies of HEW's regulations and other information are available from the Office for Civil Rights, Department of Health, Education and Welfare, 330 Independence Avenue, S.W., Washington, D.C. 20201.

Chapter 2

Fundamental Plan of Action: Goals and Priorities

Margaret Milner

Fundamental Plan of Action: Goals and Priorities

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Achieving full program accessibility for all components of a college campus or university system is a complex undertaking that must depend upon an overall fundamental plan of action in order to succeed. This plan of action will be a product of the goals and priorities established at the outset of the project. It will include reviewing new construction and general renovation projects to ensure compliance with specific accessibility criteria, as well as planning the structural changes dictated by program accessibility requirements.

In developing a fundamental plan of action, one particularly useful approach is the organization of a "campus access team." Careful selection of members can help ensure campus-wide involvement in the program, an element that is requisite to the success of the effort. All facets of the academic community need to share in the commitment to change if the program is to be carried through effectively.

While it is recognized that each institution will present a special case, certain members can be identified as essential to the team. Among those whose participation is important will be:

- *academic affairs:* to ensure full consideration of academic requirements
- *bookstore management:* to ensure that the campus bookstore will be usable by handicapped individuals
- *business or finance office:* to ensure that necessary budget commitments are made and to assist with developing additional funding resources where needed
- *campus safety and security office:* to arrange for immediate implementation of such items as parking changes and to serve as an on-site ob-

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server to identify problem areas in campus mobility, safety regulations and related matters

- *development office:* to identify and develop potential funding sources

- *facilities planners:* to coordinate accessibility modifications

- *food services management:* to coordinate services and provide planning to make existing food service facilities accessible

- *handicapped students, personnel and other qualified resource people:* This group, which would include representatives of organizations serving the handicapped and/or community-based handicapped consumer organizations, can contribute the consumer viewpoint to the total planning process. The participation of individuals whose handicaps collectively provide a cross section of disability needs is particularly recommended. Those with sight and hearing impairments, as well as those with mobility and activity impairments, need to be represented.

- *housing office:* to identify and modify barriers in campus dormitories so that handicapped students have a reasonable selection of accessible housing options

- *personnel:* to develop necessary support among staff members

- *physical plant department:* to provide detailed knowledge about facilities and current plant operation schedules, and to develop plans for integrating appropriate accessibility modifications into routine maintenance procedures

- *public relations:* to promote positive public education activities as part of the total project

- *registrar and/or admissions:* to assist with details on current and anticipated student populations

- *specialized schools and departments:* to contribute expertise in disciplines related to the problem areas. Where rehabilitation and health science is included in an institution's curriculum, for example, representatives of these schools can be productive team members. Schools of architecture, environmental design, interior design, industrial design or civil or industrial engineering can also provide representatives whose participation will be particularly valuable in surveying for barriers, developing campus design standards and designing modifications.

- *student government:* to engage the interest and promote cooperation of the entire student body

- *student union management:* to help ensure that recreational and social activities will be made accessible to handicapped persons

The composition of the access team will vary from campus to campus, but all institutions should consider including representatives from the physical plant, academic affairs and facilities planning areas. In addition, the complexities of funding through operating and capital budgets or from special fund accounts, as well as from outside sources, makes the participation of the business and development offices crucial to the total program.

The campus access team may be most effective when it functions as a continuing group to advise on all aspects of program development and implementation. It is the logical forum for developing the institutional policies that will determine the plans for program accessibility. It will also help to provide the necessary continuity between the program planning phase and the longer range goals embodied in the transition plan for structural changes.

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Establishing Goals, Objectives and Policy Guidelines

The development of recommended policy guidelines is an appropriate role for the campus access team. In formulating policies and program goals, the following principles should be considered:

- *readily accessible facilities:* This is the concept of providing access for handicapped individuals that is substantially equivalent in terms of ease and convenience of use to that afforded the able-bodied. Achieving this condition may require going beyond strict interpretations of recommended standards such as the American National Standards Institute (ANSI) A117.1 accessibility criteria. According to the size of a given building, for example, it may be necessary to provide two, three or more accessible entrances in order to avoid forcing handicapped students to take circuitous routes between and within buildings.

- *promoting independent mobility:* Making facilities accessible through such expedients as providing on-call assistance is at best a less-than-satisfactory solution and should not be considered a final response to an access problem.

- *mainstreaming:* The environment should be designed to provide handicapped students with the maximum possible freedom to use campus facilities on an equal basis with able-bodied students. This means, among other things, making primary building entrances accessible and developing wheelchair routes that lie within major traffic flow patterns of the institution. The goal of mainstreaming is to avoid special solutions earmarked as "special accommodations" and to provide opportunities for handicapped students to enjoy lifestyles similar to those of their able-bodied colleagues.

- *involving handicapped consumers in the decision-making process:* The true needs of handicapped people may best be assessed by the consumers themselves. Section 504 regulations require that handicapped people be consulted in development of the transition plan and in the self-evaluation process. This consultation may be extended to actual participation in making program decisions.

- *right to risk:* Handicapped students and staff members should enjoy the same freedom to make decisions and assess risks as others in the campus community. As a corollary, institutional rules and regulations on campus behavior should apply equally to the able-bodied and the handicapped.

It is important that consensus on goals be reached by all members of the access team in order to ensure the full institutional commitment to the program that is essential for its success. Once goals have been developed reflecting the principles endorsed by the campus authorities, objectives to realize those goals can be established. For example, these minimum objectives, which could be supplemented or enlarged according to individual campus priorities, might be selected:

- making all modifications conform, at a minimum, to the requirements of state and local building codes and the criteria of ANSI A117.1

- first-floor accessibility in primary or core buildings

- usable work spaces in at least one laboratory of each department

- campus-wide system of curb cuts and ramps

With goals clearly defined and agreed upon, policy guidelines can be developed. Effective policies will be those that are comprehensive,

true to the spirit of the campus commitment and feasible in terms of financial and administrative capability of the institution. The guidelines should be broad enough for effective coverage, specific enough to ensure a consistent approach campus-wide and flexible enough to allow for innovative solutions.

The next step will be the critical task of setting priorities for facility modifications.

Setting Priorities

The ordering of priorities may vary according to particular campus situations, building uses, curriculum requirements, number of floors in given buildings and types of building construction. The advice of handicapped students about the most important items will be invaluable at this stage of the program.

In general, these items are considered essential for minimum accessibility and are usually prioritized in the following hierarchy:

- *access to campus and buildings*, including reserved parking, other site accommodations for the handicapped user and entry to buildings through a primary public entrance

- *access to primary and support facilities*, such as classrooms, laboratories, libraries, health services and administrative offices: Assessments of immediate needs in terms of curriculum demands and essential services will determine the buildings in which primary use facilities must first be made accessible.

Institutional policy guidelines will then determine the priority to be given to upper levels of multistory buildings. Facilities with existing elevators or ramps are likely candidates for early modification efforts to upper floors. Where policy decides against installation of elevators, it may still be appropriate to make modifications that will allow persons with crutches, braces and other semiambulatory disabilities to use the space. In planning administrative areas, it may be possible to designate an accessible office or conference room in a given building as common space to be available to all faculty within that building for student consultation.

Dining facilities, post offices, dormitories and apartments also need to be made accessible. In the case of campus housing, the principle of mainstreaming would suggest that a variety of types and locations should be available to handicapped students.

- *access to toilet rooms and other necessary facilities:* Ideally, one toilet stall in each rest room in a building would be made accessible. Where constraints of the existing structure make that impossible, the size and use of the building can be taken into account to determine a reasonable accommodation. Water fountains and telephones are also in this category.

- *student union, physical education and extracurricular student life activities:* Handicapped students will want to claim their rights to equal use of recreational facilities such as swimming pools, bowling alleys, and other sports facilities and programs. Adaptive physical education programs may be developed in addition to making sports facilities accessible.

Differing situations and characteristics that prevail on different campuses will affect the specific ordering of priorities. Urban campuses, for example, may be free of concern about residential needs but may put stronger emphasis on working with the surrounding community. The residential campus, on the other hand, may be assigning priorities among housing and food

services, and possibly, more extensive medical services. Some campuses will find that priorities are affected by climate or topography, by size of enrollment or by academic specialization, as in the different problems confronting a technical school and a small liberal arts college.

Current student body composition may also affect priorities. It may be possible, for example, to assign priorities for immediate changes to first- and second-year curriculum areas if there are no upper-level handicapped students currently enrolled. Follow-up assessment can be made of anticipated demands in order to plan subsequent priorities.

Implementing the Fundamental Plan of Action

To oversee the implementation of the plan, it is advisable to appoint a technical task force with the necessary expertise to review plans and supervise construction in order to monitor compliance with accessibility requirements.

The plan itself should detail program phases, which will include accessibility modifications, renovations and new construction, according to the schedule that will be determined by the priorities.

In design and construction of new facilities, it is essential to begin the design process with complete awareness of the full range of needs that must be accommodated. Given this consideration at the outset, it is possible to build new facilities that are completely accessible with little or no additional cost.

The same is true when planning a renovation project. Including accessibility features in remodeling plans need not add significantly to the total project cost. In order to assure that accessibility considerations are included in such planning, however, it is essential that projects be monitored closely.

Given the time constraints of the three-year transition plan period, scheduling of facilities modification work will be a critical task. Target dates must be set for design and development contract procurement; materials ordering, renovation and construction activities; and inspection of each specific project.

Project scheduling and control will be improved by the use of management techniques such as Gantt charts or network (CPM or PERT) charting. Fig. 2 shows a sample Gantt chart scheduling the receipt of drawings.

It is worthwhile to consider immediate scheduling for the more easily completed and lower cost projects. The completion of these projects will help to focus awareness on the larger program being undertaken and will provide a tangible reminder of the institutional commitment as other work requiring longer lead time is being carried out.

Initial Efforts

These actions can be taken as immediate steps in implementing the plan:

1. Review recommended changes to identify those that can be accomplished through routine work orders.

2. Revise routine maintenance procedures as needed to ensure accessibility. New priorities may be assigned to areas such as sidewalk repair, ice and snow removal, and elevator maintenance.

3. Establish safety policies that recognize campus modifications. The addition of ramps and curb cuts, for example, may require changes in bicycle regulations.

4. Set up reserved parking spaces in appropriate locations.

Other procedures could be considered:

1. Develop a basic accessibility design criteria package to ensure the consistent application of a uniform standard on all projects.

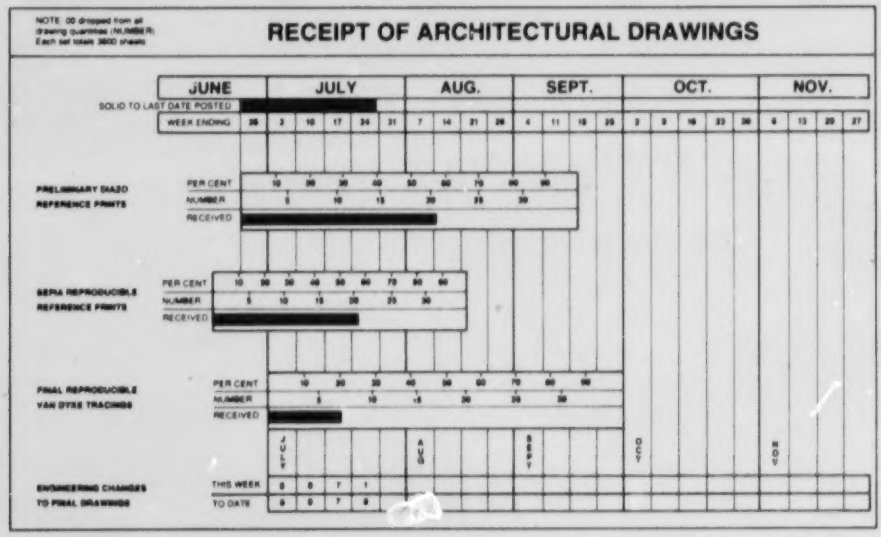
2. Conduct training sessions both for staff members who will be working on the program and for consultants and contractors.

3. Establish systematic procedures for plan review and supervision of work to monitor compliance with accessibility standards.

Public education can be a continuing function throughout this process. This effort, which is a logical extension of the required public reporting process for Section 504 compliance, might be assigned as a further responsibility of the campus access team.

The content of public education programs should focus on the rewards that will be realized from the accessible campus, with emphasis on the contributions that handicapped students and staff will make to the institution and to society at large.

Fig. 2 Gantt scheduling chart



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Following Through

While the first efforts of most institutions may be limited to meeting immediate, high priority needs on campus, there is a further goal that many may want to consider.

The program accessibility and transition plan efforts that were required by Section 504 should, if properly executed, provide a solid foundation for formulating a comprehensive plan for full accessibility. Although the Section 504 regulations do not require full facility accessibility, it is an end worth working toward for institutions of higher education. As a long-range goal, it can be planned in incremental stages that recognize realities of funding and academic priorities. For those campuses accepting this challenge, the modifications accomplished during the transition period can constitute the basic building blocks around which further alterations can be organized. With essential items such as a system of curb cuts, major building accessibility and program accommodations in place, it will be possible to schedule additional work in phases as resources permit.

Chapter 3

Facilities Inventory, Survey and Evaluation

Margaret Milner

Facilities Inventory, Survey and Evaluation

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Although many college campuses have been working toward the goal of full program accessibility for a number of years, the enactment of Section 504 regulations placed previously voluntary activities into the realm of mandated actions.

Under the Program Accessibility section of the regulations, recipients are required to make each program or activity, when viewed in its entirety, readily accessible to handicapped persons. This was to be accomplished by August 2, 1977, except where structural changes in facilities are necessary to achieve program accessibility.

Methods that may be used to achieve program accessibility include, but are not limited to, redesign of equipment and reassignment of classes or other services to accessible buildings.

While the regulations do not require structural changes in existing facilities where other methods are effective in achieving program accessibility, it seems evident that many institutions will find it necessary to embark on a program of structural modifications. This is particularly likely in view of the position stated in Analysis of Final Regulations, Appendix A, issued by the Department of Health, Education and Welfare in April, 1977.

According to this analysis of the regulations, if sufficent relocation of classes is not possible using existing accessible facilities, enough alterations to ensure program accessibility are required. Further, a college or university may not exclude a handicapped student from any specifically requested course offering because it is not offered in an accessible location.

In developing program accessibility plans, close coordination between academic and physical plant departments will be necessary to assure the selection of efficient and cost-effective solutions.

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While academic planners may assist with establishing priorities for modifications, the physical plant administrator should be able to identify the facilities that are usable with little or no change or that can be modified quickly using in-house personnel. At the same time, the physical plant administrator's knowledge of codes and standards that must be met may rule out adoption of some alternatives that might otherwise be selected because of cost factors or ease of accomplishment.

For those facilities identified in program accessibility plans as requiring structural modifications, alterations must be made by June 3, 1980. To execute these structural changes in an efficient and cost-effective manner will require a series of sequential tasks, beginning with a complete facilities inventory and survey of existing barriers.

How to Recognize a Barrier

Barriers in the built environment are generally invisible to the able-bodied person who has never been made aware of the environmental needs of physically handicapped people. Architectural tradition has accustomed people to monumental steps at entrances to public buildings, to small vestibules and narrow stalls in public toilet rooms and to sunken conversation pits in hotel lobbies. Familiarity has led to unquestioning acceptance of a built environment that requires the user to adapt to its configuration.

As medical science and changing social attitudes have added greater numbers of physically handicapped people to the active population, the obstacles imposed by the environment have come to be more fully recognized. Common usage today assigns the term "barrier" to any element of the manmade environment that prevents full and free use of that environment by members of society.

Inspecting a facility from the perspective of its usability by people with mobility or manual impairments or with sight or hearing disabilities will reveal those aspects that may constitute a barrier. Design criteria for accessibility provide further insight into more detailed facets of the problem in addition to presenting specifications for removing or avoiding barriers—or, in more graphic terms, developing an environment that adapts to the people who use it.

Disabling Conditions and Design Requirements

Most standards and recommended design criteria now in circulation are based on the needs of four basic types of handicapped persons: persons in wheelchairs, persons on crutches, blind persons and hearing impaired persons.

An expanded categorization of disabilities may be useful in planning for the wide range of handicaps that may be found on a given campus. A partial listing of the conditions that should be considered would include:

- *temporary impairments*, encompassing fractures, pregnancy and convalescence from disease, trauma or operation: It has also been noted that the concept of temporary handicap could be extended to cover those engaged in carrying or moving large or heavy loads.
- *activity impairments* other than mobility, visual or auditory impairment: This category is generally descriptive of persons suffering diseases of the heart or lungs, neurological diseases that result in lack of coordination, or forms of arthritis

or rheumatism. It also includes extremes of size and weight from dwarfism to obesity.

- *mobility impairments (semiambulatory)* that cause difficulty in walking, climbing, bending or otherwise curtail the mobility of the individual: Persons who use crutches, canes, walkers, braces, artificial limbs or orthopedic shoes are included in this category.

- *mobility impairments (nonambulatory)* referring to those disabilities that confine an individual to a wheelchair all or part of the time

- *manual impairments*, either partial or total loss of manual dexterity in one or both hands

- *visual impairments*, ranging from color blindness to dysfunctions such as loss of sight in one eye, cataracts and ophthalmologic diseases

- *hearing impairments*, including partial loss of hearing or total deafness

- *aging*, which may have effects encompassing many of the disabling conditions identified on this list

Specific design requirements dictated by these conditions are based upon:

- specifications of the standard wheelchair including turning radius and clearances for the wheelchair in motion

- clearances for crutches and other walking aids

- techniques for using canes and guide dogs

- limitations of reach for users of wheelchairs and other mobility aids

- effects of ambient noise on residual hearing capabilities, and the visual requirements for lip reading and manual interpretation

More detailed information on the interplay between various disabling conditions and performance in the built environment is given in Chapter 5.

Surveying for Barriers

While professional consulting firms can be commissioned to conduct barrier surveys, a more *cost-effective approach* would be to use staff members, student workers or a combination of both. Some campuses have conducted surveys entirely with volunteers from service groups, fraternities and sororities or consumer organizations.

Other institutions have carried out their surveys as work/study projects for students. An example of an operation of this type was a survey of mobility needs of blind students at a state university. At this institution, faculty members and students in the environmental design department teamed with visually handicapped student workers to conduct the project. Departments of design or rehabilitation education are principal candidates for development of work/study projects, though other academic areas such as social work or management programs may also be sources.

Whatever the source of manpower, the survey itself is best conducted by teams of at least two people, one to record and one to measure. Team members need to be prepared for their assignments by training sessions that provide the background knowledge needed for an effective survey.

Organizations experienced in facility surveying indicate that 20 to 40 minutes should be allotted for surveying typical commercial buildings. Detailed surveys of larger educational buildings will

require more time; one university allows four hours per building with a team of two surveyors.

Given the time constraints under which most colleges are carrying out their Section 504 compliance programs, the survey may have to be conducted in two phases: an initial mini-survey of facilities designated as high priority areas essential to accommodate immediate needs, followed by an expanded survey of the entire campus for identification of total accessibility needs.

The separation of the survey project into discrete tasks is recommended by some schools, while others have found that tasks can be combined. Staff members at a liberal arts college suggest that the identification of barriers be isolated as the initial task, with development of recommended solutions and prioritizing of modifications scheduled as two distinct follow-up components of the project.

On the other hand, one urban university has found its survey process, which combines facility survey, some initial recommendations for solutions and priority setting in a single operation, works well for its system. Survey teams at this school consist of one handicapped student and one architecture student; the liberal arts college utilizes physical plant staff members.

Utilizing Handicapped Consumers

The accessibility survey is one of three phases of the total campus access program in which the participation of handicapped individuals is particularly significant. The handicapped members of the survey team will be logical choices to assist in the other areas where handicapped consumer information is important: the development of accessibility policy guidelines and establishment of priorities.

Recruiting individuals representative of a cross section of disability types for the survey project can go far toward guaranteeing that adequate consideration is given to the needs created by all types of handicapping conditions. Having a handicapped person on each survey team helps to ensure that subtle but important factors are not overlooked in assessing the usability of a given facility. It may also prevent "overadaptation" by providing a realistic consumer appraisal of actual accessibility requirements.

It is essential that individuals selected for the survey team be chosen on the basis of their knowledge of environmental barriers as well as for representation of a variety of disabilities, including hearing and sight impairments, orthopedic handicaps and other disabling conditions.

Handicapped students, staff and faculty members are likely candidates for such a consumer panel. Local organizations of handicapped people, or local organizations serving the handicapped, are also recommended as a source of knowledgeable assistance. A number of national organizations have local chapters that may be available to help with campus projects. Among them are:

American Coalition of Citizens with Disabilities
1346 Connecticut Avenue, N.W., Room 817
Washington, D.C. 20036
(state chapters)

American Council of the Blind
1211 Connecticut Avenue, N.W., Suite 506
Washington, D.C. 20036
(state and local chapters)

Disabled American Veterans
3725 Alexandria Pike
Cold Spring, Kentucky 41076
(state and local units)

Epilepsy Foundation of America
1828 L Street, N.W.
Washington, D.C. 20036
(local chapters)

Little People of America, Inc.
P.O. Box 126
Owatonna, Minnesota 55060
(local members will be identified)

National Association of the Deaf
814 Thayer Avenue
Silver Spring, Maryland 20910
(local chapters)

National Association of the Physically Handicapped
76 Elm Street
London, Ohio 43140
(local chapters)

National Congress of Organizations of the Physically Handicapped
6106 North 30th Street
Arlington, Virginia 22207
(state councils composed of organizations of handicapped people)

National Federation of the Blind
1346 Connecticut Avenue, N.W.
Washington, D.C. 20036
(local chapters)

National Multiple Sclerosis Society
205 East 42nd Street
New York, New York 10017
(local chapters)

National Paraplegia Foundation
333 North Michigan Avenue
Chicago, Illinois 60601
(state and local chapters)

Paralyzed Veterans of America
4330 East West Highway, Suite 300
Washington, D.C. 20014
(state and area chapters)

Conducting the Survey

To get the survey underway, an orientation and technical training session should be conducted for all team members. Sources of assistance in developing an effective orientation/training session would include campus and community organizations of disabled people and voluntary or professional service organizations. Community Independent Living, Inc., P.O. Box 991, Monroe, Georgia 30655 offers information on training barrier surveyors. Other assistance may be available from:

American Institute of Architects
1735 New York Avenue, N.W.
Washington, D.C. 20006
(state societies and local components, many with barrier-free design committees)

American Society of Interior Designers
730 Fifth Avenue
New York, New York 10019
(local chapters)

Advocates for the Developmentally Disabled
6643 Tabor Avenue
Philadelphia, Pennsylvania 19111

Lions International
York and Cermak Roads
Oak Brook, Illinois 60521
(local clubs; particular emphasis on visual handicaps)

National Easter Seal Society for Crippled Children and Adults
2023 West Ogden Avenue
Chicago, Illinois 60612
(state and local affiliates)

National Rehabilitation Association
1522 K Street, N.W., Suite 1120
Washington, D.C. 20005
(state and local chapters)

President's Committee on Employment of the Handicapped
1111 20th Street, N.W.
Washington, D.C. 20036
(Governor's Committees in fifty states; Mayor's Committees in major cities)

Rehabilitation Services Administration
Department of Health, Education and Welfare
330 C Street, S.W., Mary Switzer Building
Washington, D.C. 20201
(offices in ten federal regions)

United Cerebral Palsy Associations
66 East 34th Street
New York, New York 10016
(local associations)

Additional assistance may be available from state departments of rehabilitation and local private rehabilitation agencies.

The survey instrument to be used by the teams may be developed by the institution, tailored to the particular characteristics of the campus. In actual practice, however, colleges and universities will be likely to find that the general survey format recommended for public buildings and facilities will serve equally well on campus with minor modifications and additions.

Another option would be to adopt one of the survey instruments already prepared for another campus. Two examples of campus survey forms follow in this chapter's Appendix as Items A and B.

For institutions choosing to develop their own surveys, these general recommendations may prove useful:

1. Keep the format simple for ease in data collection and analysis.

2. Use a format in which negative responses always indicate an inaccessible feature; e.g., avoid phrasing such as "Do wheelchairs travel behind parked cars?" and use instead, for example, "Can wheelchairs avoid travel behind parked cars?"

3. Consider accommodations needed by all disability groups.

4. Include requirements for special use areas such as dining halls, dormitory rooms, gymnasium and locker room facilities, external as well as internal spaces and equipment, library and laboratory spaces and vending machines.

5. Include existing transportation vehicles and facilities.

6. Provide any special information that surveyors may need to make appropriate judgments on accessibility, such as requisite width of parking spaces and door clearances.

In designing the survey, two reference documents will be especially useful as a supplement to the information contained in Chapter 5. The first, American National Standards Institute (ANSI) A117.1, provides a concise set of minimum specifications. More detailed criteria can be found in the second resource, *Architectural Accessibility for the Disabled of College Campuses*. ANSI A117.1 is now being revised, but the current standard, which is referenced in Section 504 regulations, is still available for $2.75 from the American National Standards Institute, 1430 Broadway, New York, New York 10018. Single copies of the second reference are available at no charge from the State University Construction Fund, 194 Washington Avenue, Albany, New York 12210, or from the Architectural and Trans-

portation Barriers Compliance Board, 330 C Street, S.W., Washington, D.C. 20201.

In addition to the survey form and pads for note taking, team members may be equipped with line drawings of floor plans of the buildings being surveyed, on which barriers can be recorded as they are located. Another recommended technique is to photograph barriers wherever they are found in the course of the survey. The marked-up line drawings, together with the photographs, provide adequate documentation to begin formulating plans for modifying facilities.

Evaluating the Results

Information collected by the facility survey should be evaluated by individuals thoroughly trained in barrier-free design concerns. This skill is particularly essential when applying accessibility criteria to existing facilities. The depth and subtlety of detail that is involved in many barrier problems requires full understanding of functional requirements and relationships between handicapped user and environment.

Values upon which facility evaluation should be based have been identified by Professor Timothy J. Nugent, Chairman of the Department of Rehabilitation Education of the University of Illinois, as *purpose, intent, performance requirement* and *functional concept*. Given that accessibility design criteria are generally developed to guide new construction, the problems faced in making existing facilities usable may not be amenable to strict application of those criteria. It is at this point that evaluation of performance requirements and functional concepts should come into play, freeing the administrator to seek creative solutions to specific problems while remaining true to the purpose and intent of the overall accessibility program.

Appendix to Chapter 3

Item A

HIGHER EDUCATION ACCESSIBILITY PROJECT
Abt Associates Inc. Cambridge, Massachusetts

A. CLASSROOM OR LABORATORY BUILDINGS

FOR EACH CLASSROOM OR LABORATORY BUILDING, PLEASE ANSWER THE FOLLOWING QUESTIONS:

1. Name of Building _____

2. Major types of classes taught in building. *(Check all that apply.)*
   - [ ] Agriculture (plant science, animal science, farm management, forestry, etc.)
   - [ ] Architecture
   - [ ] Business (accounting, marketing, etc.)
   - [ ] Computer science (including computer facilities)
   - [ ] Economics
   - [ ] Education (elementary, secondary, special education, etc.)
   - [ ] Engineering (chemical, mechanical, civil, etc.)
   - [ ] English (literature, journalism, etc.)
   - [ ] Fine and performing arts (art, music, drama, etc.)
   - [ ] Foreign languages/linguistics
   - [ ] Health sciences (nursing, physical therapy, etc.)
   - [ ] History
   - [ ] Law
   - [ ] Mathematics and physical sciences (chemistry, physics, statistics, etc.)
   - [ ] Medicine/ dentistry
   - [ ] Philosophy (religion, classics, etc.)
   - [ ] Psychology
   - [ ] Sociology (anthropology, archeology, etc.)
   - [ ] Speech (pathology, therapy, etc.)
   - [ ] Other (specify): _____

3. Location of Building
   - [ ] Main campus
   - [ ] Location other than main campus

4. Number of classrooms/laboratories in this building: _____

If this building contains any dining or library facilities, be sure to also complete a Part C (Other Buildings and Facilities) sheet for the building, following the instructions to Part C.

5. Which of the following accessibility features are generally available in this building?

SEE INSTRUCTIONS FOR DEFINITIONS OF TERMS USED IN THE FOLLOWING ACCESSIBILITY QUESTIONS.

a. **Entrance**

Please indicate the characteristics of the *most accessible* entrance into the building (i.e., the *widest* entrance with the *fewest* steps and *most easily opened* door).

1. Width minimum of 36"?
   [ ] Yes [ ] No

2. Entry level ground-level or ramp?
   [ ] Yes [ ] No
   (If no, how many steps?_____)

3. Door readily opened independently by a person in a wheelchair or on crutches? (Consider force required to push or pull door open; direction of opening; placement of door handles, presence or absence of an electric eye; and presence or absence of double doors.)
   [ ] Yes [ ] No

4. Entrance type *(Primary entrance* is one normally used by students to enter the buildings; *secondary entrance* is one not normally used as an entry by students e.g., kitchen entrance, delivery entrance but can be used by disabled students.)
   [ ] Primary [ ] Secondary

NOTE: Specific dimensions and other design criteria used in these survey forms are those of the survey developers and do not necessarily conform to ANSI A117.1 nor does their reproduction here constitute their recommendation by the publisher.

b. Approach to building

1. Parking spaces 12' or wider (1½ car widths) reserved for handicapped students?
   [ ] Yes [ ] No
2. Curb cut or ramp to sidewalk near entrance described in "a" above?
   [ ] Yes [ ] No
3. If yes, is it textured (e.g., does it have a rough or gravelled strip) to warn blind persons of the intersection?
   [ ] Yes [ ] No

c. Internal level changes

1. Building type?
   [ ] Single story [ ] Multistory
   If single story, skip to Part d, Toilets.
2. If multistory, does building have elevators?
   [ ] Yes [ ] No
3. If building has elevators, please indicate the characteristics of the *most accessible* elevator (i.e., *fewest* steps to get to the elevator, *widest* elevator door and elevator cab size).
   a. Elevator serves all floors of the building used by students?
      [ ] Yes [ ] No
   b. Disabled students permitted to use elevator? (Includes elevators which all students may use and those to which disabled students are issued keys.)
      [ ] Yes [ ] No
   c. Must another person be contacted prior to *each* use of elevator (e.g., to secure a key unlocking the elevator, etc.)?
      [ ] Yes [ ] No
   d. Elevator door width at least 32"?
      [ ] Yes [ ] No
   e. Elevator cab size at least 5'0 by 5'0"?
      [ ] Yes [ ] No
   f. Elevator control buttons inside and call buttons outside at wheelchair level, no more than 48" from floor?
      [ ] Yes [ ] No
   g. Raised, recessed, or braille numbers and letters in elevator cab?
      [ ] Yes [ ] No
   h. Raised, recessed, or braille numbers and letters indicating the floor on door facing?
      [ ] Yes [ ] No
   i. Elevator primary use:
      [ ] Passenger [ ] Freight

d. Toilets

Please indicate the characteristics of the *most accessible* bathroom(s) in the building (i.e., with the *widest* entrance door and the *widest* toilet stall).

1. Entry door to bathroom at least 32" wide?
   [ ] Yes [ ] No
2. Door to toilet stall at least 32" wide and outswinging?
   [ ] Yes [ ] No
3. Toilet seat 18" to 20" above floor?
   [ ] Yes [ ] No
4. Grab bars or handrails in stalls?
   [ ] Yes [ ] No
5. Sufficient clear space (at least 32") on one side of toilet for wheelchair?
   [ ] Yes [ ] No

6. Clear space below a sink for person in wheelchair (29½" above floor level)?

   [ ] Yes [ ] No

7. Check each of the following which is accessible from a wheelchair (maximum 40" above floor level):

   [ ] Soap dispenser

   [ ] Towels

   [ ] Mirror

   [ ] Sink faucets

8. Single lever control sink faucets?

   [ ] Yes [ ] No

9. Number of male and female bathrooms in building *which conform to description given above*:

   _____ male bathrooms

   _____ female bathrooms

   _____ bathrooms serving both sexes

e. Interior

Please indicate which of the following features are contained in the building.

1. Fire alarms which are reachable from a wheelchair? (No more than 48" from floor)

   [ ] Yes [ ] No

2. Fire alarms with both audible and visible signals?

   [ ] Yes [ ] No

3. Doors with knurled or textured handles to warn the blind of danger areas?

   [ ] Yes [ ] No [ ] No hazardous areas

f. Accessibility features for classroom or laboratory buildings

Please indicate the number of classrooms, lecture halls and laboratories in the building which have the following features:

1. Level space for wheelchairs in optimum viewing area of class _____

2. Moveable desks and chairs in classrooms _____

3. Moveable work stations (e.g., laboratory tables), or if there are fixed work stations, a minimum clear width of 3 feet between aisles _____

g. Please specify below any additional modifications, adaptations or characteristics of this building which *facilitate* its use by disabled students (e.g., water fountains or pay telephones at wheelchair level, etc.).

_____

_____

_____

_____

_____

h. Please specify below any additional characteristics of this building which *hinder* its use by disabled students (e.g., steps to enter rooms, heavy doors, narrow corridors, narrow doors, shag or thick carpeting, etc.).

_____

_____

_____

_____

_____

Item B

46

State University Construction Fund: State of New York

FACILITY ARCHITECTURAL ACCESSIBILITY PROFILE REPORT

CAMPUS _____ CAMPUS NUMBER _____

BUILDING _____ BUILDING ABBREVIATION _____

DATE OF REPORT _____ BY _____

GENERAL INFORMATION [ ] *NUMBER OF FLOORS IN FACILITY (INCLUDING BASEMENTS, SUB-BASEMENTS)*

N	S	E	W	
[ ]	[ ]	[ ]	[ ]	*NUMBER AND LOCATION OF ENTRANCES WHICH PERMIT ACCESS (M - MAIN ENTRANCE T - TUNNEL B - BRIDGE)*
[ ]	[ ]	[ ]	[ ]	*NON ACCESSIBLE ENTRANCES WITH LEAST NUMBER OF STEPS (NUMBER OF STEPS & LOCATION)*
[ ]	[ ]	[ ]	[ ]	*FLOOR LEVEL OF ENTRANCES*
[ ]	[ ]	[ ]	[ ]	*NOTE: IF DOUBLE LEAF – CLEAR OPENING OF ONE LEAF SHOULD BE RECORDED*

(IN INCHES TO NEAREST INCH)

[ ] N/A (1 Floor Only)

[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] *THE LEVELS (FLOOR NUMBERS) THAT ARE NOT ACCESSIBLE*

[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] FLOOR NUMBERS WHERE FLOOR IS NOT LEVEL THROUGHOUT

NA: INFORMATION NOT AVAILABLE FROM DRAWINGS AND SPECS

ROOMS NOT ACCESSIBLE (FLOOR/RM)

PROFILE INSTRUCTIONS

This profile form was created to be of assistance during the design phase of building, although it can be used during or after construction. To use it most effectively, both the drawings and specifications for the facility should be readily available. If you are not familiar with the building; thoroughly examine the contract documents to get an overview before starting.

If you follow the procedure listed below, the form can be efficiently filled out.

1. After familiarizing yourself with the building check the "door schedule". Under the **DOOR** section on profile form, list all doors which do not meet the 32" clear opening requirement. Next, check threshold types and list all those which do not meet the requirements. Using the specifications, check door hardware and again list those not meeting criteria *(It will probably be necessary to check manufacturers literature under this cateogry).*

2. Review the floor plans and check the door designation for each room in the building. List, under **"Rooms Not Accessible"**, all rooms which do not permit access. Also indicate information under **"Accessible" and "Non Accessible" Entrances** under **General Information.**

3. Check both the drawings and specifications for elevator information and fill out the blanks in the **Elevator** section indicating:

OK	Meets criteria
NO	Does not meet criteria
NA	Information not available from Drawings and Specifications
NP	Not programmed for this building

(Additional information and notes can be put in to the right of the "Criteria Statement". These codes should be used where applicable for other categories on the form).

4. Using the information previously filled in; next fill out the **"Levels Not Accessible"** and **"Floors Not Level Throughout"**.

5. Referring to the Specifications and Drawings, check the criteria listed under **"Restrooms"** and choose the restrooms which come the closest to meeting these requirements. Fill in the information requested. Under **"General Comments"** list additional restrooms and their locations.

6. Referring to the Specifications and Drawings fill in the rest of the forms where appropriate.

ELEVATORS

TYPE OF ELEVATORS (Passenger-Freight)	FLOORS SERVED (OB: Basement, 01: 1st, 02: 2nd etc.)

Minimum ANSI 61, NYS 72, SUCF 74 Requirements

_____	Size	4'-3" x 5'-8" interior cab size MIN (2,000 lbs. capacity)
_____	Doors	Clear opening of 32" minimum
_____	Maximum control	48" above floor (ANSI and SUCF 76)
_____	Handrails	3 sides (2 sides minimum)
_____	Signals at Landing	both audible and visual
_____	Space in front of elevator	4' x 5' space unobstructed area
_____	Door Safety	safety shoe plus photo electric eyes or other sensing device

Additional Basic Criteria (SUCF 76)

_____	Emergency controls	grouped at bottom
_____	Door opening duration	see SUCF 76
_____	Signals	audible signals should ring once for up and twice for down
_____	Leveling	+ or – 1/2"
_____	Floor identification	3" high raised letter at 5' above the floor on both inside jambs /high contrast
_____	Button identification	placed to left of button / raised lettering / high contrast/min. ⅜" high letters
_____	Button type	flush or protruding
_____	Emergency telephone	If provided, located within 30" to 48" height above floor

STAIRS

Minimum ANSI 61, NYS 72, SUCF 74 Requirements

_____	Riser height	Recommended maximum 7" – 7½"
_____	Handrails	32" above tread (measured vertically from nosing)
_____		one handrail extending 18" beyond ends of stairs
_____	Landings	contrasting in color from stairs
_____	Nosing	no projecting nosing (ANSI 61)

Additional Basic Criteria (SUCF 76)

_____	Identification	handrails at landings (recommended) should have plate with floor ID attached
_____	Nosing marking	non carpeted stair; entire length of each nosing high contrast/non skid
_____		carpeted top and bottom tread high contrast
_____		20 ft. candles

DOORS

On standard side hung doors the clear opening is usually 2" less than actual door width. On balanced doors refer to manufacturers specs.

[ ] (To nearest inch) **STANDARD DOOR CLEARANCE**

[ ] (Y or N) **90% OF DOORS MEET ABOVE**

Minimum ANSI 61, NYS 72, SUCF 74 Requirements

_____	Threshold	No higher than 3/4" beveled or flush with floor [½" SUCF 76]
_____	Kickplates	12" high kickplate recommended for high wheel-chair traffic
_____	Handles	easily gripped (lever / push plate / panic bar)
_____		42" above floor level (panic bar 36" above floor)
_____	Dangerous Areas	knurled handles
_____	View panels	all swinging doors (recommended 3' above floor)
_____	Opening pressure	not exceed 8 lbs.
_____	Depth between two doors	minimum 6'-6" [7'-6" SUCF 76]
_____	Min. clear opening	32" preferably 34" [34" SUCF 76]
_____	Doorway matting	recessed if it exceeds ½" above floor level [SUCF 76]
_____	Floor area	level for a distance of 5' from door in direction of door swing extend 1' beyond each side of door (ANSI) [3' beyond latch side of door - SUCF 76]

DOOR TYPES NOT MEETING ABOVE CRITERIA

DOOR TYPE NUMBER FROM DOOR SCHEDULE	EXTERIOR OR INTERIOR	REASON

50

RESTROOMS

At least one public facility (male and female) in new construction shall meet larger stall requirements and be located on main entrance floor level or as close to this floor as possible. Each floor having facilities above and below this level shall meet at least the requirements for a 3' wide stall plus other rest room requirements below.

(Fill in information on most accessible restrooms in building; preferably those on or closest to main level)

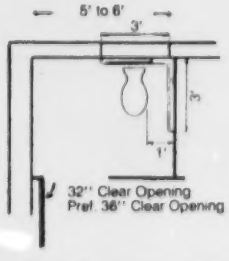
MALE	FLOOR	(N S E W)	(Near. Inch)	(Near. Inch)	(Y or N)
FEMALE	FLOOR NUMBER	LOCATION	ENTR CLEAR	STALL ENTR CLEAR	GRAB BARS

Male	Female	*Minimum ANSI 61 NYS 72, SUCF 74 Requirements*	
_____	_____	Depth of stalls	5'-6" minimum (3' wide stall) "A"
_____	_____		5'-0" minimum (5' to 6' wide stall) "B"
_____	_____		
_____	_____	Height of toilet seat	17½" to 20" pref. 18"
_____	_____	Grab bars	on both sides of toilet 32" above floor horizontal minimum 4'-0"
_____	_____		1½" O.D.
_____	_____		1½" from wall
_____	_____	Turning space	5' x 5' in front of toilet stall
_____	_____	Lavatory	faucet handles (easily operated no self closing faucets)
_____	_____		knee clearance (height above floor minimum 27½" pref. 29") (Note: old NYS and SUCF of 26" is not accep.)
_____	_____		hot water lines and drains protected
_____	_____	Mirror	bottom edge not more than 36" above floor or tilted (30" SUCF 76)
_____	_____	Paper towels, sanitary napkins, etc.	maximum 40" above floor level
_____		Urinals	floor mounted or wall mounted not greater than 19" above the floor pref. 15" (SUCF 76)
_____	_____	Passage into restroom	vanity partition do not interfere with wheelchair accessibility (pg. 49 SUCF 76)

A

MINIMAL MODIFICATION ACCEPTABLE (NOT USABLE BY MANY)

B



WATER FOUNTAINS [If Provided]

LOCATION (FLOOR AND NSEW)	NUMBER OF ACCESSIBLE FOUNTAINS

	Minimum ANSI 62, NYS 72, SUCF 74 Requirements	COMMENTS
_____	Controls	up front/blade type handles or push buttons
_____		mounted both sides [SUCF 76]
_____	Spouts	up front
_____	Height above floor	spout 31" to 33" above floor
_____	Recessed areas	minimum of 3' wide pref. 5' wide
_____	Depth of fountain	minimum projection of 8" to 12" from rear wall

PUBLIC TELEPHONES [If Provided]

LOCATION (FLOOR AND NSEW)	NUMBER OF ACCESSIBLE TELEPHONES

	Minimum ANSI 61, NYS 72, SUCF 74 Requirements	COMMENTS
_____	Dial height	44" above floor
_____	Number	at least one public phone where provided shall be accessible
_____	Enclosure	3 sided carrell or wall mounted
_____	Identification	one phone in bank of phones should be identified as having equipment for those with hearing disabilities
_____	Cord length	3'

SIGNAGE

	Minimum ANSI 61, NYS 72, SUCF 74 Requirements	COMMENTS
_____	Room identification	raised letters or numerals
_____	Placement	adjacent to handle side of door on wall 5' above floor level
_____	Dangerous zones	hardware should be knurled at doors leading to dangerous areas

WARNING SIGNALS AND HAZARDS

	Minimum ANSI 61, NYS 72, SUCF 74 Requirements	COMMENTS
_____ Type of communication	both audible and visual in all cases (ANSI) [SUCF 76]	
_____ Hazards	openings or open manhole coverings in existing pedistrian paths – warning devices (ANSI 61)	
_____ Obstructions protruding into paths of travel	signs, lights, door closers, no lower than 7' above floor level (ANSI 61)	

CONTROLS

	Minimum ANSI 61, NYS 72, SUCF 74 Requirements	COMMENTS
_____ Height	maximum of 48" above the floor (switches / thermostats / firealarms)	

INTERIOR FLOOR TREATMENT

		COMMENTS
_____ Surface	non-slip, firm even	
_____ Carpeting	[see page 75 SUCF 76]	

SPACE CRITERIA

SPACE TYPE	LOCATION (FLOOR NO.)	TOTAL NUMBER OF STATIONS	NUMBER OF STATIONS FOR DISABLED (pg. 107 and 109)	LOCATION IN SPACE	ACCESSIBLE FROM WHAT FLOOR LEVEL

ASSEMBLY AND LECTURE STATIONS FOR DISABLED (If Provided)

_____ Width	36" min.
_____ Length	4'-4" min.
_____ Space	level
_____ Counters or Desks	knee clearance 32" width
_____	27½" knee clearance min. height
_____	counter height 30"

LAB STATIONS (If Provided)

_____ counter top	30" max.
_____ Controls	18" from front of counter
_____ Knee clearance	32" width
_____	27½" height
_____ Miscroscops shelf	pull out 18" above floor

CAFETERIAS (If Provided) [SUCF 76]

_____	Entrance	no turnstiles/or alternate method of entering
_____	Food lines	tray slide no higher than 34"
_____		tray slide 36" in width
_____	Dining area	tables available with minimum 27½" clearance height
_____		32" wide clearance
_____	Table spacing	[see page 72 SUCF 76]

LAUNDRY FACILITIES (If Provided)

_____	Washer/Dryer	front loading or top loading with platform
_____	Controls	on top or front/within 18" of front

POSTAL SERVICES (If Provided)

_____	Box height	those assigned to handicapped located within 28" to 42" above floor
_____	Mail drop slot height	range between 20" to 48"

SPECIALIZED FACILITIES

GYMNASIUM FACILITIES

_____	Locker rooms	accessible routing to all facilities
_____		area set aside for wheelchair use (benches removed)
_____		clothes bars in locker not to exceed 56"
_____		padded dressing table available [SUCF 76 page 103]
_____	Showers	per requirements [page 105 SUCF 76]
_____	Swimming pool	hoyer lift or ramp to pool
_____	All spectator areas	spaces provided for accessible stations

HEALTH SERVICE

	Waiting areas	within reasonable proximity
_____		accessible restrooms
_____		accessible phones
_____		area for wheelchairs to wait without being in pedestrian circulation
_____	Examination rooms and Doctor's offices	Are these spaces accessible (list those which are not)
_____	Beds	at least one bed which lowers to 20"
_____		controls for this bed within easy reach of patient
_____	Call devices	simple to operate (pressure-pad)
_____	Turning space	minimum 6' x 6'
_____	Bathrooms	minimum one shower stall and toilet per sex for inpatient care

LIBRARY

_____	**Stack aisle**	**should be 36"**
_____	**carrels**	**knee clearance 27½" height**
_____		**32" width**
_____		**4'-4" from counter edge to nearest back obstruction**
_____	**Index and reference table**	**knee clearance 27½" height**
_____		**32" width**
_____	**Entrance and exits**	**alternate means if turnstiles or gates are used for security reasons**

RAMPS

RAMP	LOCATION	INTERIOR/ EXTERIOR	SLOPE	MEETING DOORS	LEVEL AREAS	HANDRAILS	SURFACE	CURB	WEATHER PROTECTION

Minimum ANSI 61, NYS 72, SUCF 74 Requirements

Width	minimum 36" (48" SUCF 76)
Slope	equal to or less than 1 in 12 (pref. 1:16)
Handrails	32" above ramp surface on both sides extend 12" beyond ends of ramps (if this doesn't create hazard)
Surface	non-slip
Meeting door	level area 5' x 5' if door swings out and 1' beyond handle side of door of level area (ANSI) [4' from facility SUCF 74]
	OR level area 3' x 5' if door swings away from ramp and 1' of level area beyond handle side of door (ANSI) [4' from facility SUCF 74]
	level area 6' x 6' if door swings either way/level area to extend 3' beyond handle side of door [SUCF 76]
Level areas	6' of straight level run at ends of ramp (ANSI) [SUCF 76]
	4' level platforms every 30' horizontal feet of ramp [SUCF 76:6' level platforms]

Additional Criteria (SUCF 76)

Weather protection	recommended: overhead covering or heating elements to remove snow
Curb	4" high curb on both sides of ramp

PARKING LOTS

Minimum ANSI 61, NYS 72, SUCF 74 Requirements

_____	Location (NSEW of Facility Served)	
_____		spaces within 200' of facility served/each space accessible to accessible path to facility (see criteria below)
_____		spaces located so that individual in wheelchair does not have to wheel behind parked cars
_____		curb cut if not on same level as path
_____		wheelchair transfer area on same level as car
_____	Size	13' wide space or 4' wide wheelchair transfer area between standard spaces or van parking, parallel to sidewalk: sidewalk minimum 8' wide
_____	Signage	signage identifying space and accessible parking lots

Additional Basic Criteria (SUCF 76)

_____	Night	area well lighted at night

PATHS

Minimum ANSI 61, NYS 72, SUCF 74, Requirements

_____	Construction	firm and not slippery when wet
_____		minimum 4' (ANSI) [6' SUCF 76]
_____		slope no greater than 5%
_____		no abrupt changes in level or interruption by steps
_____	Meeting doors	see ramps for criteria
_____	Intersection	intersections blended by ramps

GENERAL COMMENTS

Chapter 4

Being Handicapped: What Is It?

Sigi Shapiro

Being Handicapped: What Is It?

58

To attempt to answer the question of what being handicapped means is to try to convey an understanding of the experiences of thousands of individuals who have struggled to overcome a myriad of impairments while trying to lead "normal" lives. In most cases they are excluded from a society that has consistently made plans, passed laws and designed the environment with that concept of "normal" in mind. But now there seems to be a new understanding of the term "handicapped" and the people with that label.

Most handicapped people who have coped with being disabled for some time generally consider being handicapped an inconvenience more than anything else. Being handicapped is not a curse or a terrible tragedy. Handicaps do not alter the humanity of people, their needs, desires, goals, intelligence or their potential. But being handicapped can be terribly lonely, most terrifying and inconvenient because one does not fit into the alien and unfriendly environment.

In the past, many parts of the built environment have been closed to people whose physical agility or strength had been reduced by a handicapping condition. The inaccessible environment is not necessarily the product of willful intent on the part of designers and builders. It may be due to a lack of awareness and knowledge about the restrictions imposed by a handicap or lack of understanding of the functional aspects of moving about with a handicap in a world structured for the average-sized, able-bodied person.

Today there is greater public and professional awareness of the environmental needs of handicapped people, but there frequently remains the problem of a failure to recognize all the implications of those needs when planning a facility.

With the passage of the Rehabilitation Act of 1973 and its Section 504 prohibiting discrimination

SIGI SHAPIRO is Vice Chairperson of the Pennsylvania Alliance of the Physically Handicapped and Chairperson of the Transportation Task Force of the American Coalition of Citizens with Disabilities. She hosts a three-hour, phone-in radio program covering current events on WWDB-FM. A handicapping condition has necessitated the use of a leg brace, crutches and a wheelchair during various times of her life.

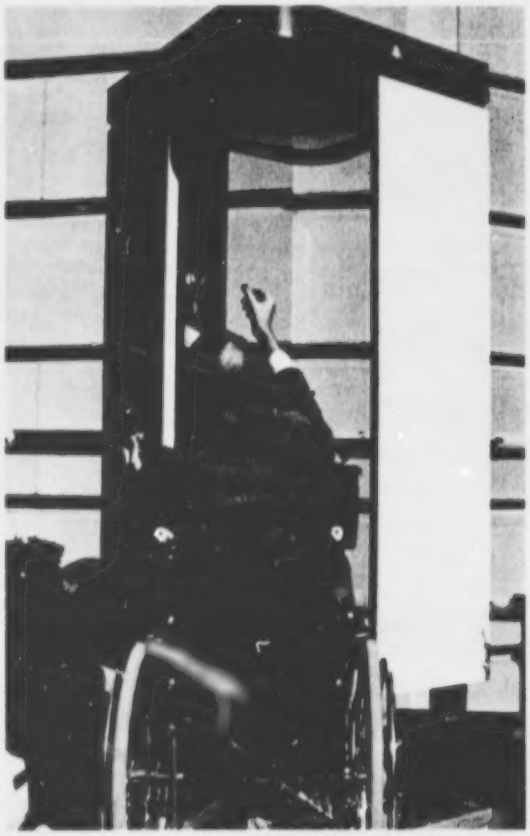
against handicapped people, a new force has been added to the growing movement for making all the facilities and resources of the United States equally available to handicapped and able-bodied citizens.

Many "normal" people have little understanding of what constitutes a barrier to a handicapped person. Trying to take a baby carriage into a grocery store can offer a glimpse of the obstacles handicapped persons face on a daily basis. Iron railings installed to keep people from taking food carts beyond the store property also prevent persons in wheelchairs from entering the store. The issue of cart barriers at supermarkets excluding the disabled shopper has been addressed in many ways. A confrontation in Delaware between disabled veterans and a store resulted in having such barriers declared a fire hazard and caused their removal. Elsewhere, a new policy was instituted permitting handicapped patrons to receive keys to the cart gate.

On college campuses, the same consideration should apply. No two campuses are the same, and individual ideas and concepts will come into play in seeking solutions. These solutions need not cost a lot of money or cause an unfair burden to be placed on campuses. With frequent, meaningful consultation between college administrators and handicapped individuals and groups, solutions can be reached that should be satisfactory to all.

Common Problems Encountered on Campuses

Handicapped college students can encounter numerous difficulties with course requirements. For example, students in foreign language courses may be assigned to special lab periods in which they use tapes to polish grammar and pronunciation. Accounting students may be scheduled for special sessions to review workbook assignments. These labs and review sessions, when located on upper floors of inaccessible buildings, can cause significant problems for handicapped persons. Therefore, it is important to consider outside course requirements as well as accessibility of actual classes.



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Students who commute to daily classes use most of the general facilities such as the cafeteria, library, administrative buildings, medical facilities and recreational areas. Even if they do not live in campus dormitories, handicapped students will want to take part in other activities such as campus clubs, the campus newspaper, fraternities and sororities.

When barriers exist, a simple activity such as eating can become a real problem. Depending upon crutches or a wheelchair for mobility can make using a cafeteria very difficult. Excessive distances between classroom buildings and the dining hall can pose a problem, as well. Curb cuts and accessible buildings would enable persons in wheelchairs to cover more distance without becoming exhausted. Many of the problems handicapped persons face may be eliminated if a staff person is available in dining areas to assist handicapped individuals by carrying trays or reading menus. Everyone, both able-bodied and

handicapped, wants to be independent and self-sufficient. Providing an environment as free of barriers as possible and additional help in the form of staff members at key facilities can encourage such independence.

After determining financial capabilities and objectives, each college and university will have to develop a list of priorities as part of its Section 504 compliance program. In doing so, it is going to be difficult to pick and choose among programs.

Having to answer such questions as "Which buildings should be done first?", "What part of the campus exterior needs attention immediately?" or "Which can wait?" will not be easy. Students representing the various disability types will probably urge that braille overlays for the blind are less expensive and should be done first, or that wheelchair access to the bathrooms is most important, or that fire alarm systems for the deaf in the dormitories are of paramount importance. All of these things are important, and the need to pick one over the other may be difficult. Campus administrators will want to consider long- and short-range goals in seeking solutions.

For example, fire alarm systems for the deaf that have light and vibration mechanisms are desirable as a safety device. However, when forced to choose between projects, this might not be the top priority. Instead, an institution could develop a fire evacuation plan using a buddy system for the hearing impaired and concentrate on getting interpreters in the classroom.

It is important that the library and other buildings that house support services be made accessible to the orthopedically disabled as well as usable by the sight and hearing impaired. However, concentrating on classroom buildings might be a higher priority financially. Therefore, programs that would provide support to handicapped students may be developed in the library until the necessary architectural renovations can be completed. Using student workers who might earn extra credit or money through part-time jobs could prove useful. Independence and dignity for the handicapped student should be a primary concern.

Some activities are essential to the college experience, such as registering for classes, buying books and seeing a faculty advisor or dean about a problem. If priorities must be established, removing the barriers to these necessary tasks may deserve serious consideration. Many of these things must be accomplished in person, and installing elevators, ramps and aids for the sight and hearing impaired in such core areas is crucial. However, under Section 504, all other methods for achieving program accessibility, such as relocation of services, should be seriously evaluated prior to considering structural changes in specific buildings.

Correcting Campus Problems

It is generally recognized that a physically limiting condition becomes a handicap at that point where it confronts an unmanageable aspect of the environment. Recognition of those areas by the planner is a first step toward creating a usable environment. Some other steps campuses may want to consider in correcting campus problems include:

- employing someone within the administration who has experience in dealing with the problems of handicapped individuals: This person could devote time to coordinating the Section 504 compliance programs as well as working with individual handicapped students. This person, if handicapped, can provide an added insight into the problems under consideration.

• establishing an advisory committee on compliance with Section 504 (and perhaps Section 503 as well): This committee should include representatives from organizations of and for handicapped people as well as individuals with a proven expertise in the design and attitudinal problems being addressed. It is important that handicapped people included on this committee be selected for their knowledge of the problem and understanding of possible solutions. A person with a handicap is not automatically an expert on disability or on design requirements.

• encouraging the formation of an organization of handicapped students if one does not already exist on campus: This organization, along with the participation of handicapped individuals in student government, can go far in helping to solve problems students may encounter. The group will be able to lend support based on the sharing of common experiences and needs, and it can be the mechanism for providing information and referrals about accessible facilities on and off campus. In addition, it can offer services such as emergency repair of mobility appliances. Such an organization can also provide social and cultural opportunities for handicapped people.

• setting realistic priorities: After determining what modifications will be required under the program accessibility plan called for in Section 504, and after reviewing its own financial capabilities and policy objectives, each college and university will have to develop a list of priorities. The task of setting priorities was discussed in Chapter 3 but it should be noted that the services of an advisory committee can be very useful at this stage. The committee can help to determine which items are most essential and may be able to suggest alternative, short-term solutions for those areas that have been assigned lower priorities. In considering their recommendations and those of others sharing in the decision-making process, colleges must weigh options in light of long- and short-range goals and be creative in seeking solutions.

• making independence for handicapped individuals a key component of the program: A buddy system will work when and where it is absolutely essential, but the ultimate goal should be to permit handicapped people as much freedom as possible to carry on their own lives.

• retaining architects who have had experience in planning for the needs of persons with a variety of handicaps: Whenever possible, this should be one of the factors used in selecting architects. If the architect is also handicapped, there will be further enrichment of professional experience. This background will enable the designer to deal with the varying and subtle problems of providing access to a wide range of buildings, from dormitories to laboratory facilities.

Conclusion

Up to now, discussions about providing access have tended to place the emphasis on the problems, either the past or present problems encountered by handicapped individuals, or the future problems of those who are now required to provide access and equal opportunities for them.

Open minds that allow for cooperation, creative thinking and the freedom to experiment, together with a working relationship between all the groups concerned, can help an institution focus on the solution, not the problem. Armed with an understanding of the functional needs of handicapped individuals, it becomes much easier to translate a design standard into an accessible facility.

The campus that is usable by handicapped people is also safer and more convenient for everyone. There will be other benefits as well.

Having the responsibility for educational facilities to be used by present and future generations is a unique trust. Education from preschool through university is the key to future growth because most attitudes and opinions are formed during the school years. The educational experience is also proving to be the key to integrating various groups of people and promoting mutual understanding. Now there will be an opportunity to open campus life more fully to handicapped people. It can be an enriching experience for all concerned.

Chapter 5

Designing for Accessibility

Robert Dale Lynch

Designing for Accessibility

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A design philosophy that places the users' characteristics and needs at the center of the planning process will lead eventually to the creation of an environment that is accessible to handicapped people as well as to the able-bodied. A description of the functional relationships between various disabilities and the use of the environment is presented in Fig. 3. This chapter and Chapters 6 and 7 will review the design requirements associated with these functional relationships.

In discussing design requirements, there is frequent confusion about laws, standards, codes and regulations. *Laws* are legally enforceable acts of federal or state legislative bodies. A *standard* is a mutually agreed upon and recommended way of doing something. It does not have the force of law unless it is specifically referenced in a legislative act. HEW's Section 504 regulations reference the American National Standards Institute (ANSI) A117.1. The specifications contained in this standard have been submitted to organizations, corporations and individuals for review and comment. They received consensus agreement before being adopted and issued by ANSI.

Regulations are promulgated by agencies under authority granted by legislation. A regulation may reference a national standard, as the Section 504 regulation references ANSI A117.1, or it may establish its own criteria. Regulations apply only to facilities under the agency's jurisdiction.

Building codes are established by states and localities to protect the health, safety and welfare of their citizens. Codes are established by legislative authority and can apply to all facilities regardless of funding or ownership.

In the various laws, codes and regulations that govern accessibility, a number of words and phrases, ranging from "barrier free" to "reason-

ROBERT DALE LYNCH, AIA, is a Project Architect with Carl G. Baker/Architects in Beaver, Pennsylvania. He is a member of the Architectural Accessibility Task Force of the Pennsylvania Governor's Implementation Committee on Access for the Handicapped.

The design recommendations in this chapter are based in large part on material originally developed by Ronald L. Mace, AIA, President, Barrier Free Environments, Inc., Fayetteville, North Carolina.

able accommodation," are frequently used. Most people working in the field agree on these common definitions of the most often repeated terms:

Accessible is used to describe those facilities or parts of facilities that may be entered and used by handicapped individuals. Accessibility includes responding to the needs of people with sight or hearing impairments in addition to those with acitivity, manual or mobility limitations.

A *barrier-free environment* has *no* physical barriers to access by any handicapped person.

Readily accessible is the concept of providing access for handicapped individuals that is of equal convenience with that provided for the able-bodied.

Reasonable accommodation is used to describe the adaptation of environments, schedules or requirements to the known physical or mental limitations of handicapped persons in a manner that does not impose "undue hardship" on an institution. Reasonable accommodation may include making facilities readily accessible to and usable by handicapped persons, as well as job restructuring, part-time or modified work schedules, acquisitions or modifications of equipment or devices, the provision of readers or interpreters, and other similar actions.

Usable describes those parts of the environment that can be used or operated by individuals with physical or sensory limitations.

Design Standards

In both new construction and modification of existing facilities, buildings falling under the requirements of Section 504 may be subject to the jurisdiction of more than one standard. ANSI A117.1, the standard referenced in Section 504, was written in 1961 and revised in 1971. A further revised and expanded ANSI is now being developed. If adopted, it is anticipated that this new ANSI standard will replace many agency and state standards and codes, bringing more uniformity to design requirements for new and existing buildings.

In the meantime, however, some funding agencies require compliance with their own standards, and state and local codes may have different requirements. It is therefore very difficult to uniformly identify specific requirements to be applied to buildings in different states. Therefore, this chapter deals with recommended guidelines rather than required criteria.

Many of the guidelines for building design described in this chapter are covered by and are in agreement with the "old" ANSI standard, and will probably be in substantial agreement with the "new" standard. Other recommendations are based on various state or agency design standards which have been found to be good design practices.

On the other hand, some additional guidelines presented here will not be found in either ANSI standard and may not be found in other standards or codes. They are discussed because they are functional recommendations that should be considered when designing new facilities or modifying existing facilities.

Although these guidelines are presented as recommendations rather than requirements, *those items that are either required or specifically recommended in the current ANSI A117.1 are italicized.* The language of these citations does not, however, necessarily duplicate the language of ANSI

Fig. 3 Functional problems related to different types of disabilities

Disability Type	*People Affected*	*Potential Problem Areas*
Difficulty Interpreting Information	• includes those who have difficulty reading or reasoning, such as young children, people who speak a foreign language and the mentally handicapped	• signs and information displays • complicated controls
Impairment of Sight	• includes not only the totally blind but also those with limited vision, such as the elderly	• orientation and route of travel • information displays • controls with complicated directions • elevator operating buttons
Impairment of Hearing	• includes partially and totally deaf people	• information transmitted exclusively by sound, such as public address systems, fire alarms, telephones, and equipment and vehicle warning horns
Loss of Agility, Long Reaction Time, Fainting, Dizziness and Poor Balance	• includes many elderly people who may move slowly, deliberately and unsteadily, as well as people with stability disorders who may need supports and rest areas • may affect people with other disabilities such as paraplegia, quadriplegia, hemiplegia, incoordination and mobility limitations	• long distances without resting places • stairs • lack of handrails, grab bars or other supports • heavy doors • elevator doors that close rapidly
Incoordination	• includes people who have difficulty controlling movement (degree and direction) of extremities	• controls and hardware operating mechanisms that require grasping or precise movement • lack of handrails, grab bars and other supports
Limitations of Stamina	• includes people who cannot walk long distances or climb stairs without extreme fatigue or shortness of breath	• distances from parking areas and transportation stops to buildings • long corridors • lack of rest areas, stairs or supports
Difficulty in Moving Head	• includes people with limited movement up and down or side to side	• location of information displays • long, complicated or crowded routes of travel
Difficulty Lifting and Reaching, Inability to Use Arms and Shoulders	• includes people who have limited or no use of their arms and shoulders and who may either be ambulatory or use a wheelchair • may accompany loss of mobility, as in quadriplegia • includes people whose use of	• hardware, controls and operating mechanisms on many building products, such as water fountains, telephones, doors and elevators • location and height of equipment or stored materials

Disability Type	*People Affected*	*Potential Problem Areas*
	upper extremities is limited by some other factor, such as use of crutches • includes wheelchair users and exceptionally short people whose reach is limited	
Difficulty in Handling or Fingering	• includes people who cannot grasp, pinch, twist, poke or perform other fine hand and finger movements • may be associated with other disabilities, such as incoordination, quadriplegia, hemiplegia or other limited use of upper extremities	• hardware, controls and operating mechanisms that require force, precise or complex movements, grasping or twisting: such controls are commonly found on door hardware, toilet room fixtures, water fountains, telephones, thermostats, vending machines and window-operating mechanisms
Difficulty in Using Legs and Feet	• includes people who walk with difficulty and who may use mobility aids (canes, walkers or crutches) • may also involve difficulty in sitting, bending and kneeling	• parking spaces • route of travel • curbs and walks • entrances and doors • changes in level • toilet rooms • seating for assembly • location of controls and hardware
Inability to Use Legs and Feet	• includes people who use wheelchairs; may be accompanied by limitations of upper extremities and trunk, incoordination, difficulty handling and fingering, limitations of stamina and sensory loss	• parking spaces • route of travel • curbs and walks • entrances and doors • changes in level • toilet rooms • seating for assembly • location of controls and hardware • water fountains and telephones • spaces too small for wheelchair maneuvering • uneven or unstable surfaces
Sensory Loss (Hypesthesia)	• loss of feeling that usually accompanies spinal cord injury resulting in paraplegia, quadriplegia or hemiplegia • may also result from disease	• injury from hot, sharp or rough surfaces that cannot be felt by person contacting them
Dimensional Extremes	• includes people of extreme height, shortness or obesity	• location of information displays • location of operating mechanisms and controls • height and width of openings

A117.1, nor is every item covered by ANSI necessarily included.

In modifying facilities, the ideal goal is to make the changes work successfully for as many people as possible at a reasonable cost. In some cases there is very little flexibility and the only option is to do whatever is possible to make a facility accessible. In many situations, there is an opportunity to genuinely improve the building or facility so that it is more comfortable and efficient for everyone who uses it.

Site Design

The following items should be considered in site design:

- transportation stops
- parking areas
- route of travel
- curb cuts
- walks
- approach to the building
- changes in level — see *Building Design* section
- information displays and warning signals — see *Building Design* section

Transportation Stops

These areas should be located near primary accessible building entrances, connected to entrances by walkways that provide the shortest possible walking or wheeling distances for people with limitations of stamina or mobility. Other considerations include:

- no curbs or abrupt changes in level between loading and waiting areas that could hinder people in wheelchairs
- benches or rest areas for those with limitations of stamina or anyone wanting to sit down or unload bundles while waiting; shelter from the weather is also an advantage to everyone.
- adequate signage (see *Information Displays)* that is large and well-lit and has lettering that contrasts with the background color

This benefits everyone using the area, especially the visually impaired and elderly.

Parking Areas

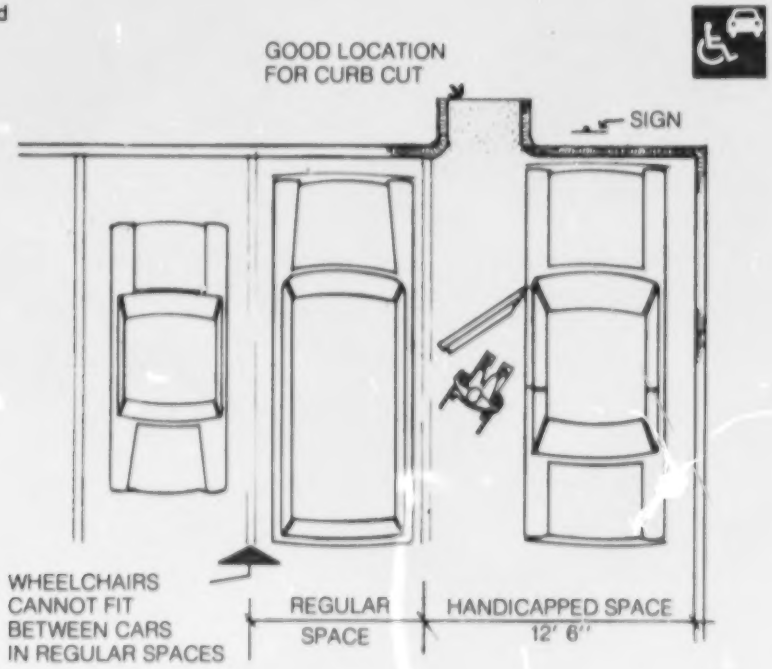
Because handicapped people are limited in their ability to move, and some cannot travel great distances, *spaces that are accessible and approximate to the facility should be set aside and identified for use by individuals with physical disabilities.* These spaces should:

- be distributed throughout a parking area to provide a choice of locations and the shortest travel distance to each major facility entrance
- be wide enough to allow *room for individuals in wheelchairs or individuals on braces and crutches to get in and out of an automobile onto a level surface, suitable for walking or wheeling,* usually *12 feet* to 12 feet, 6 inches (Fig. 4)
- have an above-ground sign designating the space for the handicapped only. A painted sign on the pavement is recommended in addition to the above-ground sign.

Route of Travel

Route of travel from designated parking spaces to buildings should not require handicapped people to move behind cars or in vehicle circulation paths.

Fig. 4 Parking for the handicapped



Careful location of curb cuts and pedestrian crosswalks is essential. The route of travel from parking to buildings should provide:

- curb cuts or elimination of curbs at points of pedestrian traffic
- smooth, hard, clean, slip-resistant surfaces with *no abrupt changes in level*
- sufficient width for an ambulatory person and a person in a wheelchair to pass each other *(minimum 4 feet)*
- no hazards such as low-hanging signs, ceiling lights, fixtures or posts that protrude into regular corridors or traffic ways. *A minimum height of 7 feet, measured from the floor, is recommended.*
- gradual slopes *with a gradient no greater than 5 percent*
- handrails at steep slopes
- sheltered places to rest where distances are great

Curb Cuts

Whenever curbs occur along routes connecting buildings, transportation stops, parking areas, sidewalks, streets and walkways, curb cuts

should be installed to blend the pathway to a common level. Existing curbs can be removed at those points and new concrete poured for curb cuts. These design considerations apply (Fig. 5):

- slopes of *no greater than one foot rise in 12 feet, or 8.33 percent*
- curb cuts marked or otherwise protected to prevent obstruction by parked vehicles or other barriers
- no abrupt drop-off on either side of the curb cut
- warning textures and other design features provided to avoid making the curb a hazard to the blind and others
- projections into the street not recommended
- curb cuts located so as not to become part of the drainage pattern

Walks

A walk is a prepared-surface, exterior pathway connecting one or more buildings, facilities or areas, placed on the existing ground level.The following features are particularly important in planning a walk:

- surface that is well drained, smooth, hard and *nonslip, with no steps or abrupt changes in level* and no loose gravel, sand or stones: Stones and other loose objects can jam and topple wheelchairs and loose gravel or sand could cause wheelchairs and crutches to sink in. Abrupt changes in level or unevenness of surface are obstacles to wheelchairs and also may trip ambulatory people, particularly those with sight impairment or incoordination. Brick and cobblestone surfaces make travel difficult or impossible for many in wheelchairs or using other mobility aids.
- sufficient width to allow one wheelchair and one ambulatory person to pass each other *(48 inches):* Where heavier traffic is expected, it is desirable to provide sufficient width for two wheelchairs to pass each other (5 feet).
- constructed at ground level or, where there is a drop-off to the ground, have handrails or curbs to prevent people from wheeling or falling off
- *occasional level rest areas on long or steep walks* for people who tire easily; The rest areas will be of benefit to all and, if possible, should provide some shelter from the elements.
- gradual *(not greater than 5 percent)* slopes
- handrails on long slopes
- curb cuts wherever walks cross driveways, streets, parking areas or other places where there are curbs
- where gratings are used, openings small enough that cane and crutch tips and wheelchair caster wheels will not be caught: Where possible, gratings should be located off the path of travel.

Approach to the Building

The approach to a building may be one of the most difficult areas in modifications work since many buildings have been sited in a monumental fashion with flights of steps to all the entrances. Most handicapped people need smooth, flat or gradually sloping surfaces to reach entrance floor levels. In a congested or urban area, finding space to provide this kind of approach may present a problem.

If the approach leads to a building with an entrance that is not at grade level, these factors must be considered in deciding how best to modify the approach:

- How far above or below grade is the actual level of the entrance?

Fig. 5 Curb cuts

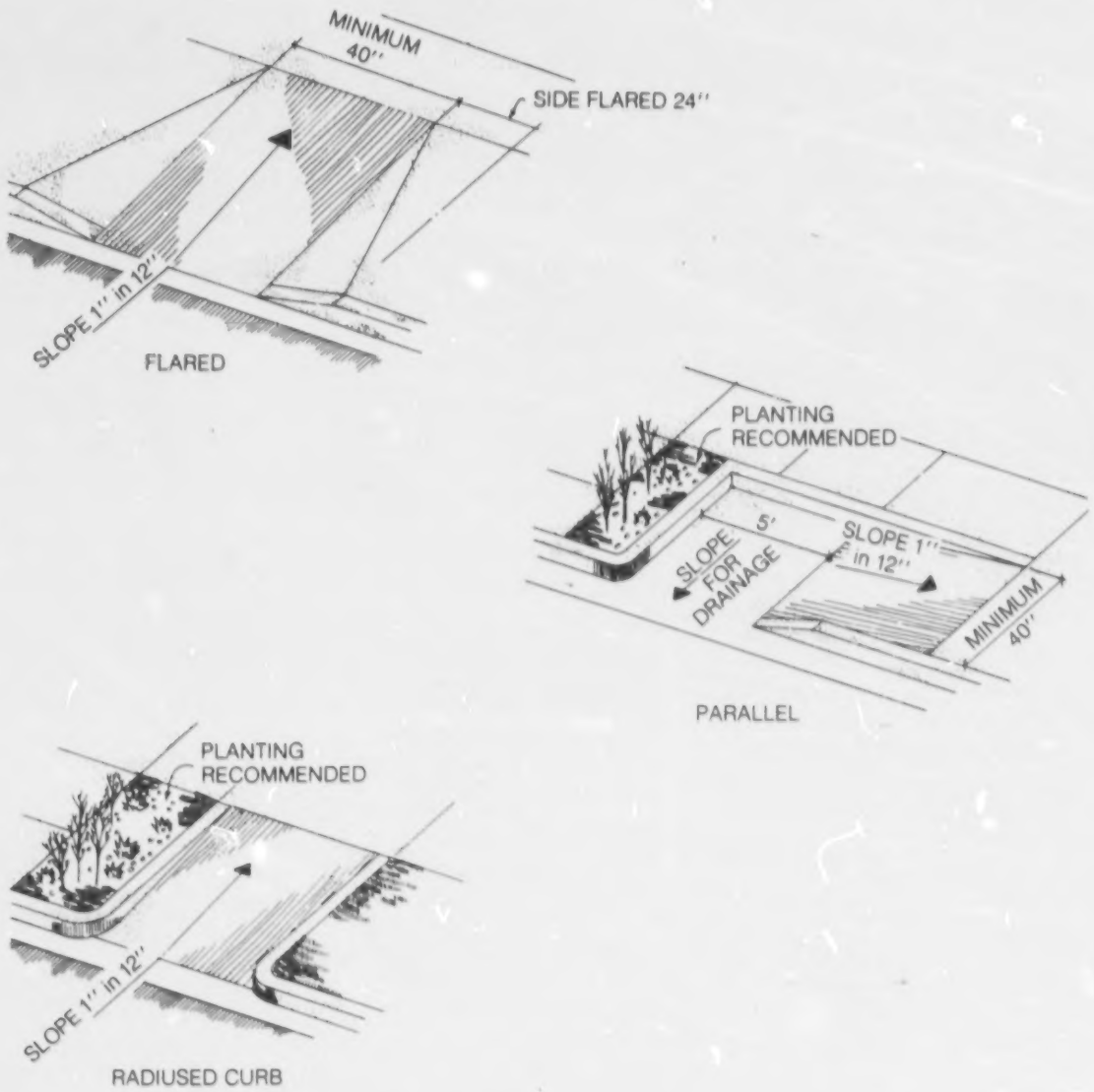


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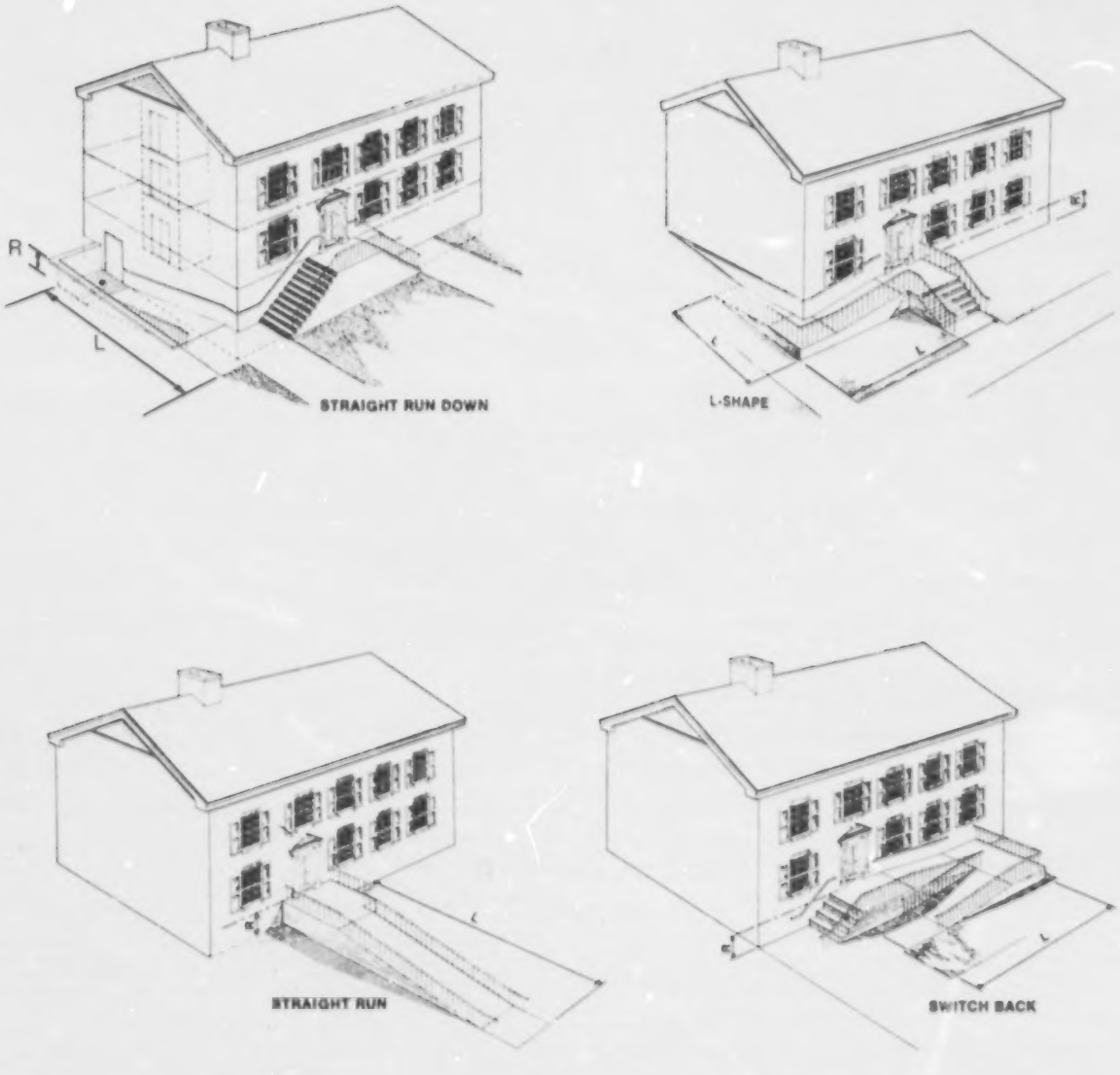
Fig. 6 Alternative ramp approaches



• How does the building relate to the site? Is the surrounding terrain flat or sloping?

Depending upon these factors, modifications for access will probably require either ramps, bridges, mechanical lifts or changes in the shape of the land to provide a smooth, gradually sloped surface. The characteristics of each are:

Ramps

Where the difference between ground level and a major building level is not too great, and there is adequate space outside, a ramp may be used to connect the two (Fig. 6). For design criteria, see *Building Design: Ramps*.

Lifts

There are a number of mechanical wheelchair lifts available that are weatherproof for permanent outdoor installation. These lifts are electrically, hydraulically or pneumatically operated and can operate up to heights of eight feet (Fig. 7). Such lifts could offer a solution to the problem of accessibility to existing buildings. See also *Building Design: Changes in Level*.

Bridges or Building Connectors

On steeply sloping sites, a bridge might be used to connect the entrance to the uphill side of the approach (Fig. 8). In some cases, it may be possible to use existing accessible facilities to provide access to an adjacent inaccessible building by connecting the two with enclosed overhead bridges (See Fig. 21).

Grading

An alternate solution that may be possible is to grade the land surrounding the entrance to provide a gently-sloping approach (Fig. 9). This eliminates the need for ramps, provides easier access, may reduce maintenance problems in severe weather and is usually a more aesthetically pleasing installation.

For detailed discussions of site work at the building approach, including vegetation, illumina-

Fig. 7 Wheelchair lift

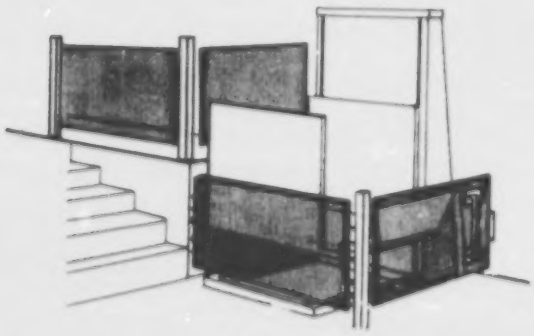
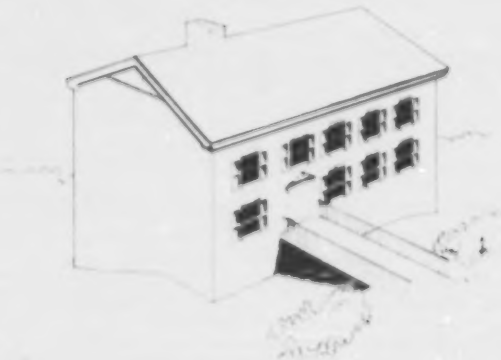


Fig. 8 Bridge



tion, site furniture and signage, see *Barrier Free Site Design*, available from the United States Government Printing Office, Washington, D.C. 20402, Stock No. 023-000-00291-4, for $2.30.

Building Design

The following items should be considered in designing buildings:

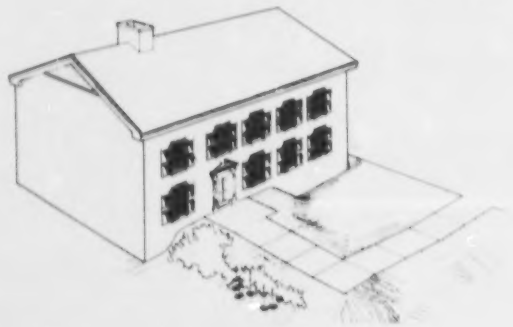
- ramps
- entrances
- doors and doorways
- floors and corridors
- changes in level — stairs, lifts and elevators
- toilet rooms
- fixtures and equipment — water fountains, public telephones, operating mechanisms and fixed furniture.
- information displays and warning signals

Ramps

A ramp is a sloping pathway used to connect different levels. It may connect a building entrance to its site, one building to another or two levels within a single building.

Ramps should be used at entrances only where grading cannot make the whole entrance gently sloping and accessible. Inside buildings, ramps should be used to connect only those changes in level of less than one floor. Elevators, wheelchair lifts or bridges from another adjacent elevator-served building are preferable to long, space-consuming ramps. For example, a 4-foot-wide ramp to connect two floors 10 feet apart vertically would require a total length for ramp and resting platforms of 142 feet, consisting of a 5-foot level platform at the bottom, four 30-foot ramp sections sloped at a one-inch vertical rise per 12 inches of horizontal run, three 4-foot intermediate resting platforms, plus a 5-foot level platform at the top.

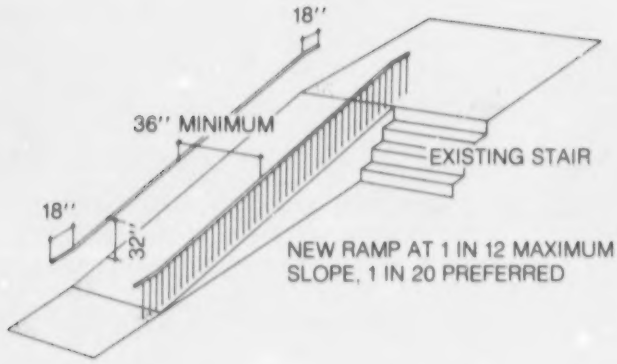
Fig. 9 Grading for an accessible entrance



General Guidelines on ramps (Fig. 10) include:

- as gradual a slope as possible, *(no greater than one foot rise in 12 feet, or 8.33 percent):* Walking or wheeling up steep ramps may be difficult, exhausting or impossible for many people.
- *smooth handrails on one side and preferably on both, 32 inches from the surface of the ramp and extending horizontally 1 foot* (18 inches recommended) *beyond the top and bottom of the ramp: This extension should not* interfere with circulation or *be a hazard*, and *may* either *be along a continuing wall* or extend to the floor (Fig. 10). Handrails prevent people from falling off the sides of ramps where there is a drop-off, serve as a guide for the visually impaired and as a support for people with balance, mobility or stamina limitations.

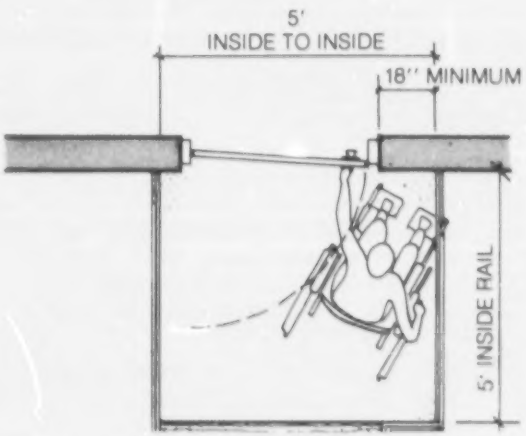
Fig. 10 Ramp and railing dimensions



- sufficient width to permit one ambulatory person and one person in a wheelchair to pass
- a level and clear *6-foot* platform at the bottom, to allow wheelchairs to stop or slow before maneuvering or meeting an obstacle
- *platforms at the top* long enough for a wheelchair to stop and maneuver, at least 3 feet deep by 5 feet wide if no door swings onto the platform, or *5 feet square where a door swings toward the ramp,* with clear space on the latch side of the door: This will permit a person in a wheelchair to remain on the level area, pull up to one side of the door and completely avoid the swing of the door as it is opened (Fig. 11).
- *level platforms at 30-foot intervals and wherever the ramp turns, for purposes of rest and safety,* to allow a person in a wheelchair to stop or turn without being on the incline
- *nonslip surface;* carborundum grit, rubber strips or rough concrete are often used.

When ramps are added where stairs or steps are in place, the latter should not be completely eliminated. Some handicapped people, particularly those on crutches, can use steps much more easily than the inclined surface of ramps. Both types of access should be provided when possible (see Fig. 10).

Fig. 11 Platform at door



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Entrances

Entrances include the approach to the building (see *Site Design: Approach to the Building),* the doorway (see *Doors and Doorways)* and the space immediately adjacent to them. At this point, the problem of getting to the level of the entrance is assumed to have been solved by grading, ramps or other means. Given that access, the following points are generally recommended:

- *at least one primary entrance that is usable by individuals in wheelchairs:* This should be not a back-door or service entrance, unless some totally insurmountable obstacle prevents any access to main entrances. Where the existing entrance presents particularly difficult problems, the measures necessary for accessibility may not be possible. In those cases, there may be a location elsewhere in the building where the grade is closer to the floor level and where a new entrance can be opened to provide access.

- *at least one accessible entrance on a level that provides access to elevators*

- *a level and clear area on both sides of the door* at every accessible entrance: This space should be deep enough *(5 feet where the door swings into the space)* so that a wheelchair can stop and maneuver while remaining on the level area outside the swing of the door. There should also be enough space *(minimum 12 inches)* beyond the latch side of the door on the pull side for a person in a wheelchair to pull up and open the door (see Fig. 11).

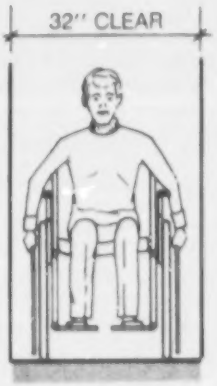
- at least two remotely accessible entrances for exit in case of emergency: Measures should be taken for early detection and control of fire, and plans for emergency rescue should be developed.

Doors and Doorways

Adult wheelchairs vary in width from a standard 2 feet 3 inches up to 2 feet 8 inches. Doors for use by people in wheelchairs or with walkers should provide a clear opening that allows space for the wheelchair and the hands and arms of the person using it (Fig. 12). The thickness of the door, the jambs and the throw of the hinges must also be allowed for (Fig. 13). Doors that do not have closers and can stand fully open are easier for many people to negotiate.

Widening of existing doors to provide accessibility depends upon the type of door, wall material and location. It may be possible in some cases to achieve the necessary clear opening by removing the stop or reshaping the door jamb without cutting the wall, or by replacing the hinges with off-set hinges. In existing buildings, costs and other considerations may prohibit widening all doors even though that could be the most desirable alternative. When choices must be made, entrance doors, doors in route of travel through the

Fig. 12 32-inch clear door width



building and doors to essential facilities such as toilet rooms should take precedence.

Two problems frequently encountered at doorways of public buildings are revolving doors and turnstiles. Both are unusable by many handicapped people. Revolving doors should be removed or supplemented with swinging doors adjacent to the existing revolving doors. Turnstiles also can be supplemented with alternative routes or removed entirely. If some barrier is necessary, a swinging gate that provides the necessary clearances could replace a turnstile.

Automatic doors that conform to accessibility requirements are very satisfactory at entrances. Sliding power doors are generally ideal. Swinging automatic doors are good for most people, but may be a hazard to the blind or visually impaired. If used, swinging power-operated doors need to have protective guide rails for approach, and should not operate if people approach from the outswing side unless the operating control mechanism is far enough from the door to allow it time to open. Standard swinging doors may be modified for automatic operation by the addition of power closers designed especially for that purpose.

The general requirements for accessible doors include:

- *clear opening of at least 32 inches:* This dimension can be negotiated with difficulty by people in average adult wheelchairs if adequate clear and *level space* is provided on each side of the door to allow the chair to enter and leave the door opening at 90° to the wall. This will require *about 5 feet in the direction in which the door swings* (Fig. 14).

- clear space (*12 inches minimum*, 18 inches recommended) on the pull side of doors at the handle side (Fig. 15): Furnishings, movable equipment and walls, if possible, should be moved back to provide this space. Where space

Fig. 13 Clear opening with door in 90° open position

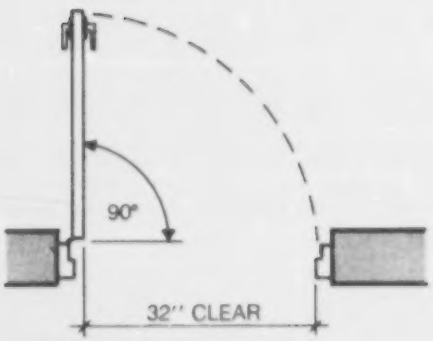


Fig. 14 Clearance beyond narrow doorways

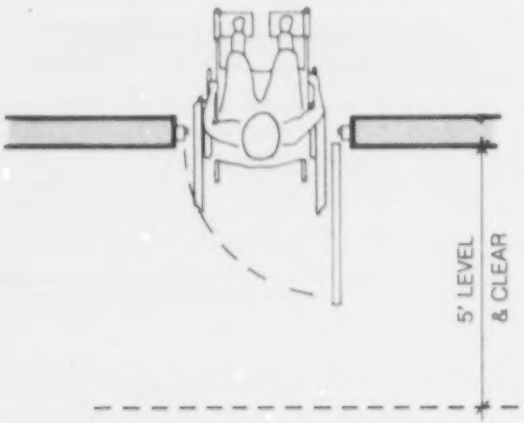
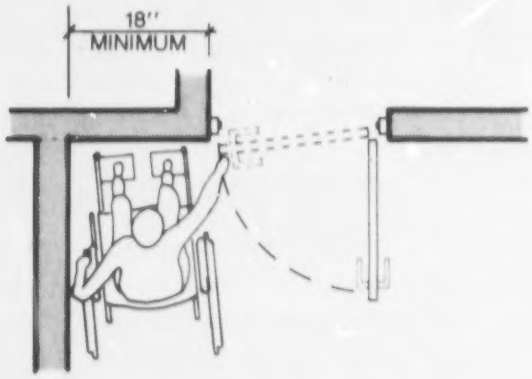


Fig. 15 Clear space on the pull side of doors at the handle side



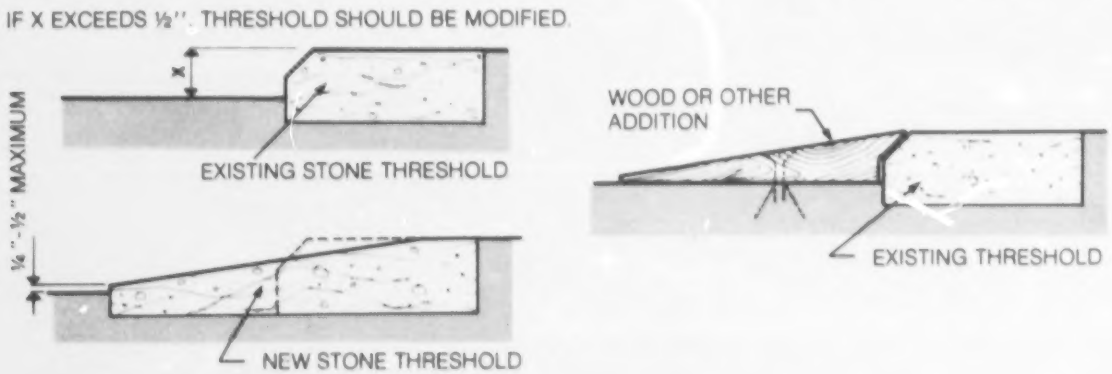
cannot be provided, doors might be equipped with very light pressure closers or closers removed entirely to make the door easier to operate. Doors without closers should have auxiliary handles near the hinge side to enable people in wheelchairs or with other mobility aids, who cannot hold the door handle while moving through the door, to pull the door closed after passing through.

- *operable by a single effort,* with lever handles rather than knobs that require gripping, twisting and pulling to open the door: Many handicapped people do not have such gripping ability. Lever handles can be operated by a single, nonprecise movement not requiring gripping or twisting and can be operated by people with little or no use of the hands or without hands, and by people whose hands are full.

- smooth *kick plates on door bottoms up to at least 16 inches from the floor, to withstand contact with wheelchair foot platforms or wheels, canes or crutches:* Often such kick plates can be added to existing doors, or, when ordering new doors, can be built in.

- *thresholds flush with the floor wherever possible:* Thresholds with abrupt changes in level, such as are typically found at doors of tile-floored toilet rooms, can block wheelchairs and walking aids and trip walking people. It is recommended that

Fig. 16 Threshold modification



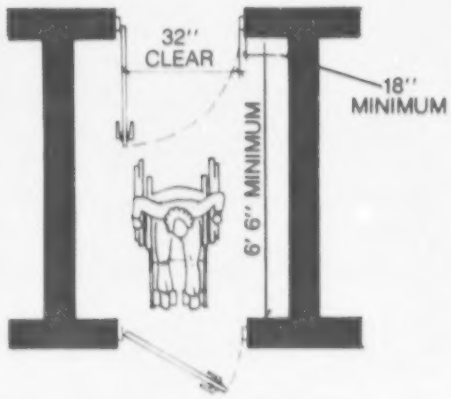
thresholds with such rises be replaced with low or sloped thresholds that blend with floor levels or have very little vertical rise (Fig. 16). At exterior doors, the problem might be solved by raising the level of the sidewalk or building a platform at floor level.

• *door closers that do not prevent handicapped people from opening the door:* Heavy doors or those with strong closers are difficult or impossible for many people to use, including those in wheelchairs or using crutches or walkers, those with little or no use of their hands and arms, and those with poor balance and little stamina. Some door closers can be adjusted to lighter pressures or occasionally removed altogether, or a new time-delay closer might be installed.

• signage, where used, *placed on the wall to the side of the door* on its handle side at approximately eye level: *Lettering shall be raised* and have high color contrast with the background (see also *Information Displays and Warning Signals).*

• distance between two consecutive doors sufficient to allow a person in a wheelchair to maneuver without being caught in the swing of either door: Where consecutive doors occur, one door might be removed or both doors hung to swing in the same direction (Fig. 17).

Fig. 17 Doors in series



Floors and Corridors

To be accessible, floors and corridors of a given story shall be of a common level throughout, or ramped at abrupt changes in level. Thresholds and sills are particular areas where abrupt changes may occur. The following considerations apply to floors and corridors:

• smooth, hard, *slip-resistant floor materials*

• carpet, where used, of a dense, tightly woven pile: Thick carpets and mats can impede wheelchair traffic and trip walking people. If door mats are necessary, they can be placed to one side of the door or be made of short, tightly woven materials without thick padding underneath. All carpets and mats should be securely fastened to the floor.

• sufficient corridor width for an ambulatory person and a person in a wheelchair to pass each other, with space for two people in wheelchairs to pass if possible: Where corridors are long and narrow and cannot be widened throughout, alcoves for resting or passing are recommended where possible.

• *no low overhanging signs, ceiling lights,* fire extinguishers, fountains *or other objects protruding into circulation spaces:* Such objects can be a hazard to the blind or visually impaired and those with incoordination or poor balance. These objects should be removed, or might be sheltered behind wing walls or extensions to the floor so that they can be detected by a person using a long cane.

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Changes in Level

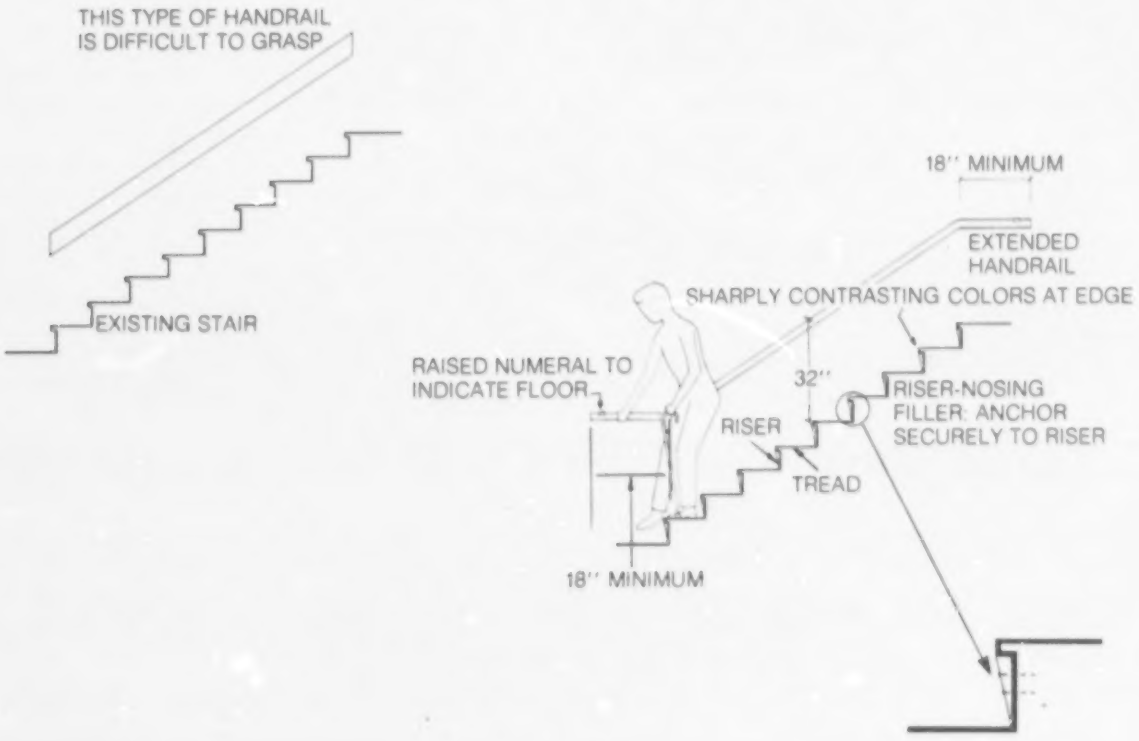
Changes in level, meaning vertical movement, may vary from a high threshold of a few inches to several stories. Problems of vertical circulation may be among the most difficult to solve, but there are several possible approaches:

Stairs

Where stairs exist, they should be made as safe and usable as possible. Modifications to existing stairs are obviously more important in buildings where stairs are the only means of vertical circulation and less important where elevators offer the primary means of vertical circulation. Some design recommendations are:

- *handrails* on both sides of stairs, continuing around landings and *extending horizontally at least 18 inches beyond the top and the bottom of stairs: Where stairs will be used by children, a second lower handrail is recommended.*

Fig. 18 Stair and railing criteria with detail of riser filler



• *no square or abrupt nosings,* which may catch the toes of people who must drag a foot up along a stair riser: Such nosings can be modified by addition of fillers securely anchored to riser faces (Fig. 18). The front edge of the former nosing and a 1-inch wide strip on the tread at the nosing should be of a sharply contrasting color to make stairs more visible to those with visual impairments.

• *risers not exceeding seven inches wherever possible:* New stairs should be designed with the riser dimension small and the tread dimension ample so that the angle of climb will not be too steep and hazardous.

• raised numerals indicating floor level on the top of handrail extensions near each end as an aid to the blind: Tactile warning strips are also recommended at the top and bottom of stairs to warn visually impaired people of potential hazards.

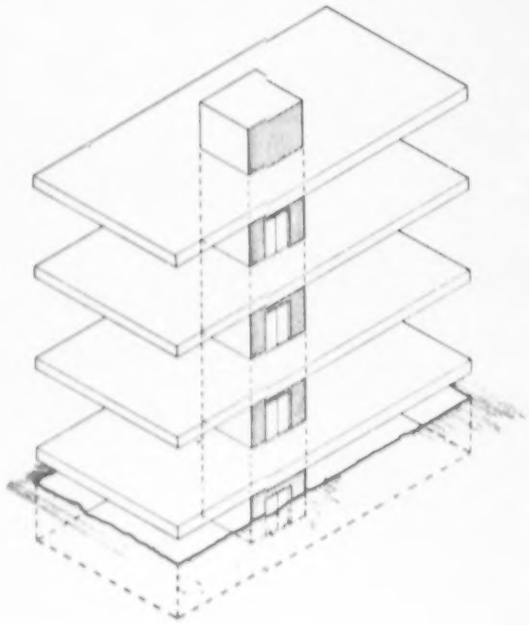
Lifts

Where constructing a ramp may be impossible due to space limitations, small mechanical wheelchair lifts are a possible solution. There are several lifts available, one of which is pictured in Fig. 7.

Two types of lifts for this purpose are wheelchair platform lifts, used for rises of a few feet; and stairway incline lifts, which may be installed at existing stairs to connect one or more floors. These lifts can be used where elevators are too costly or cannot be installed because of structural problems. Manufactured lifts have a lift range from two to eight feet and are either electromechanical, hydraulic or pneumatically operated.

Lifts can be semienclosed and equipped with entrance locks for safety. They can also be key-operated for limited use or operated by button-type, "dead-man" controls as an additional safety precaution.

Fig. 19 Elevator added inside existing building



Elevators

Elevators, the ideal solution to vertical circulation, are essential to the functioning of handicapped people in multistory buildings. Elevators may be added to existing buildings in several ways. Elevator shafts can be placed inside existing buildings (Fig. 19) with a common accessible space located on each floor. In this case, the function of the building will be interrupted or reduced during construction, the floors and roof must be remodeled to accommodate the shaft, and the elevator

Fig. 20 Free-standing elevator added to existing building

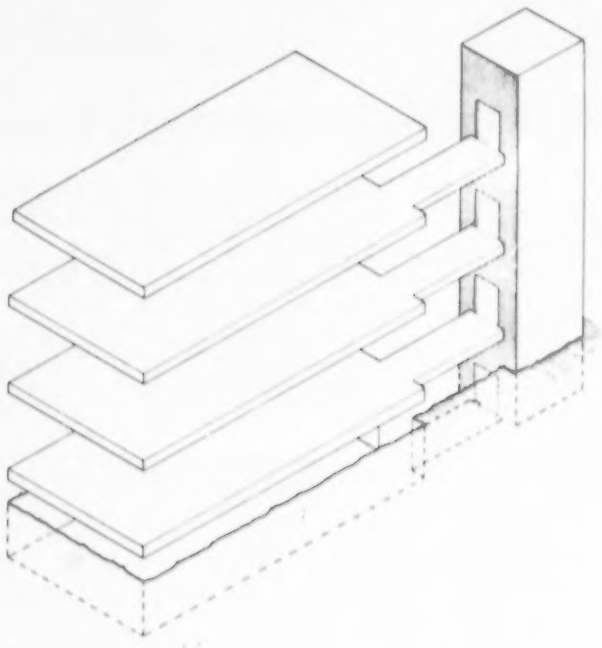


Fig. 21 Free-standing elevator with bridges to existing buildings

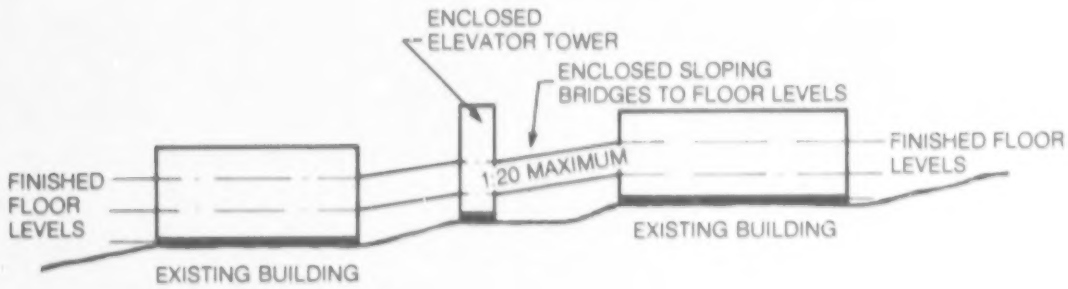
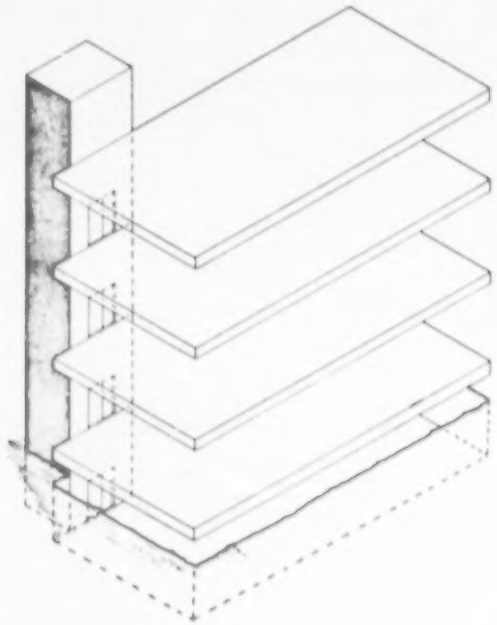


Fig. 22 Elevator added abutting exterior wall of existing building



.ust be located to avoid interference with heating and ventilating equipment.

Another approach is to construct the elevator shaft as a free-standing unit connected to the building by bridges at the various floor levels (Fig. 20). An installation of this type could even serve more than one building or wings of a building with different floor levels by bridging from the elevator to the adjacent floors on either side (Fig. 21). Locating the elevator outside the building will not interfere with mechanical or structural systems in the building and thus will not disrupt operations during construction.

A third option is to abut the elevator shaft against an exterior wall of an existing building (Fig. 22). A common accessible space must be located at that wall on each floor to serve as the elevator lobby. This configuration is less likely to interfere with mechanical or structural systems in the building than an internal elevator and will not greatly disrupt operation of the building during construction. An external shaft should be designed to blend with the style of the building or should be located in an inconspicuous place.

Elevators may be cable-operated or hydraulic. Cable-operated elevators require a large penthouse on the roof or in the attic space, can affect the appearance of a building and may be especially difficult to construct on buildings with a sloping roof. Hydraulic elevators require a shaft below the bottom floor for a piston as deep as the height to the top floor and, in addition, must have an equipment room for pumps and an oil storage tank on the bottom floor. During construction, a drilling rig must operate inside the building.

Design considerations applying to elevators include:

- elevator buttons both inside the cab and outside in lobbies *within reach of a person seated in a wheelchair* (Fig. 23): To achieve this, existing elevator control panels might be lowered or an additional set installed at a lower level.

- raised numerals beside elevator buttons on control panels to aid the visually impaired in floor selection, with raised numerals on the door

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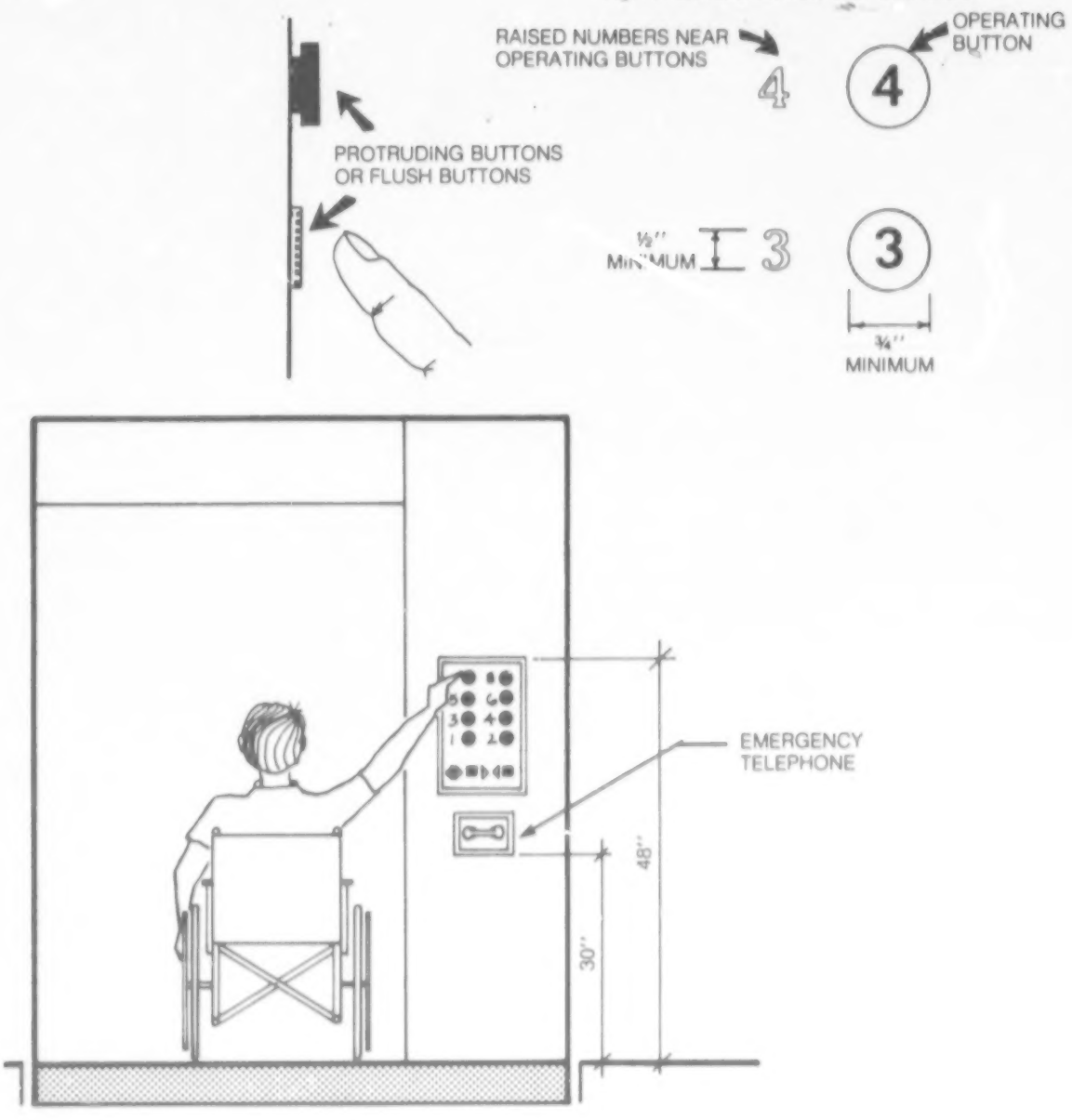
Fig. 23 Elevator controls and identification



jamb at each floor to aid in identifying floor levels: Raised numerals should be as large as possible and can be applied mechanically or with adhesive. Vandalism may be a problem with applied numerals unless they are made of a durable material and are securely fastened.

- arrival and direction signals for elevators that are both audible and visible.

- handrails provided around three sides of the cab to assist people in maintaining balance and stability in a moving elevator

For further details on elevator design, refer to *Suggested Minimum Passenger Elevator Requirements for the Handicapped*, July 1976, available from the National Elevator Industry, Inc., 600 Third Avenue, New York, New York 10016.

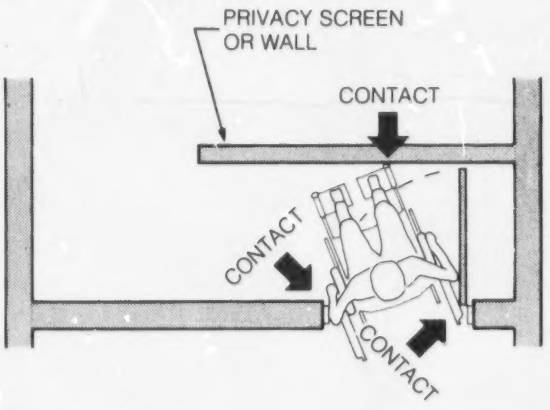
Toilet Rooms

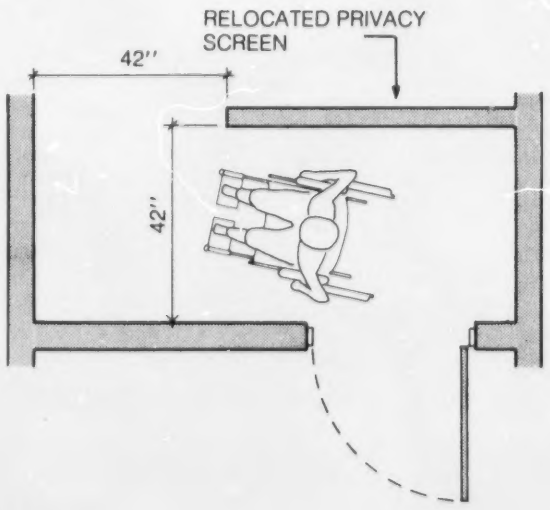
Accessible toilet rooms are a high priority item in making buildings usable by all persons. An accessible building is not truly usable until access to the toilet rooms makes it possible to remain in the building for long periods of time to attend classes or to work. If the existing toilet rooms cannot be modified because of numerous barriers and structural constraints, a new toilet room may be necessary elsewhere on the floor. The following considerations apply to toilet rooms:

- doors meeting recommendations described under *Doors and Doorways*, including 32 inches of clear width when open: Entrances with two consecutive doors in a configuration that may trap a wheelchair should be modified by removing one door or having both swing in the same direction (see Fig. 17).

- entrances not blocked by privacy screens that restrict access by people in wheelchairs: Such screens might be removed or relocated (Fig. 24).

Fig. 24 Toilet room privacy screen





• *sufficient space for wheelchair traffic within toilet rooms:* A 5 feet square clear space is needed to allow individuals in wheelchairs to manuever to approach the various fixtures and to allow a 180° turn to exit the room facing forward. Fig. 25 demonstrates the rationale for a 5 feet by 5 feet clear space up to 10 inches above the floor, at which height clear space may reduce to approximately 4 feet. Above 2 feet 6 inches, the clear space could be further reduced to approximately 3 feet. Although 5 feet by 5 feet clear from floor to ceiling is desirable, Fig. 25 shows that fixtures may overhang the 5 feet by 5 feet area where space is limited.

Toilets and Toilet Stalls

Toilets and toilet stalls are another aspect of toilet room design. There are basically two types of toilet stalls required by most codes and standards. One is long and narrow (3 feet by 6 feet, or in ANSI A117.1, *3 feet wide by 4 feet 8 inches, preferably 5 feet deep) with a high toilet seat 20 inches above the floor;* the other is square (5 feet by 5 feet) with a standard-height toilet seat.

The transfer method for the first type takes some agility and training on the part of the user, particularly if the transfer is being made from a wheelchair. The high seat is an advantage only to

Fig. 25 Wheelchair turning clearances

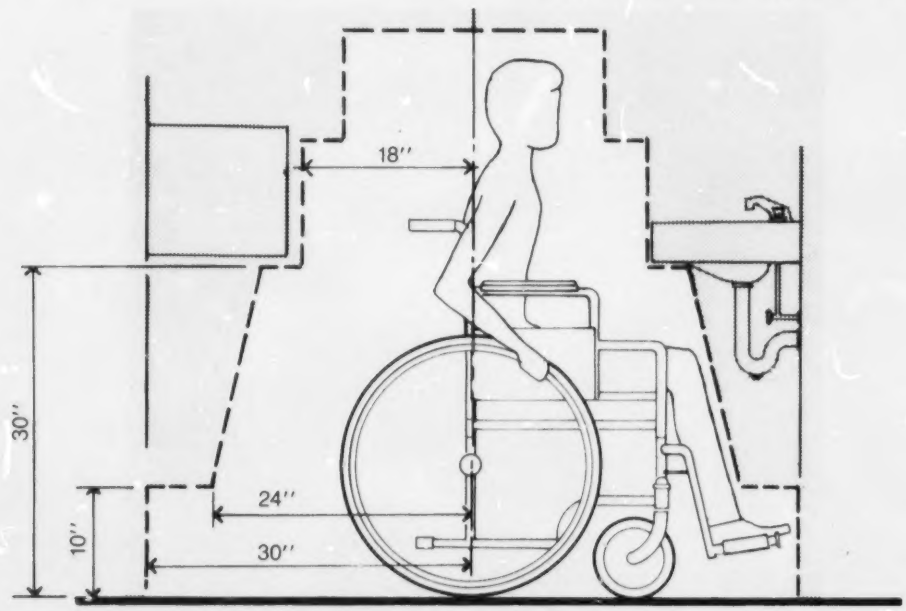


Fig. 26 Three feet by six feet stall

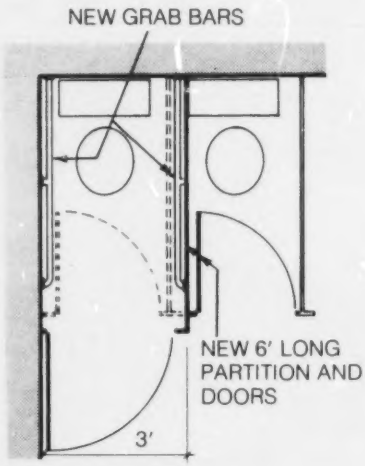
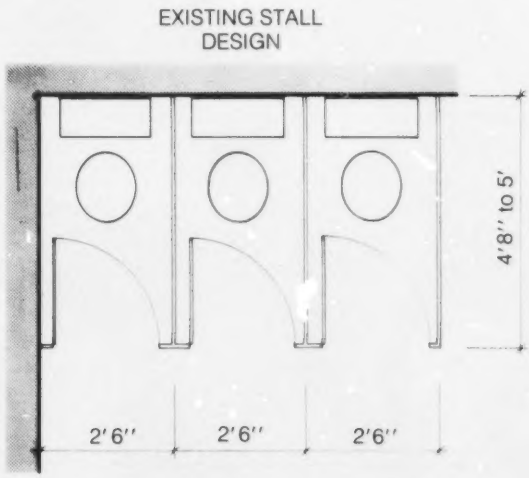


Fig. 27 Five feet by five feet stall

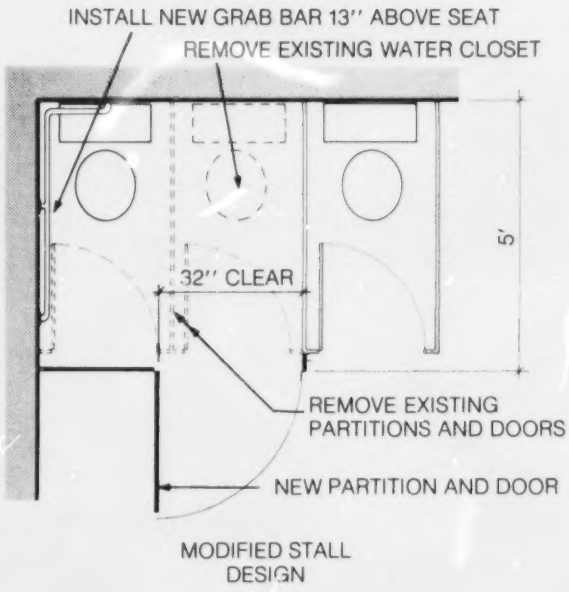


those who have difficulty sitting and rising and is hard for many people in wheelchairs to manage.

In modifying existing toilet rooms, this stall requires new, longer partitions to make the stall deeper, the addition of two long grab bars and a high toilet. The space is not always available for these modifications and many disabled people cannot use this stall (Fig. 26).

The second type of stall generally accommodates anyone who can make a toilet transfer at home, since the space provided is similar to that of a residential bathroom. The 5 feet by 5 feet stall allows several different types of transfer and is consequently usable by more people. It is also usually easier to install as a modification.

Standard toilet stalls in existing toilet rooms may be 2 feet 6 inches wide by 4 feet 8 inches to 5 feet deep. In such rooms with multiple fixtures, the recommended 5 feet by 5 feet space for approach



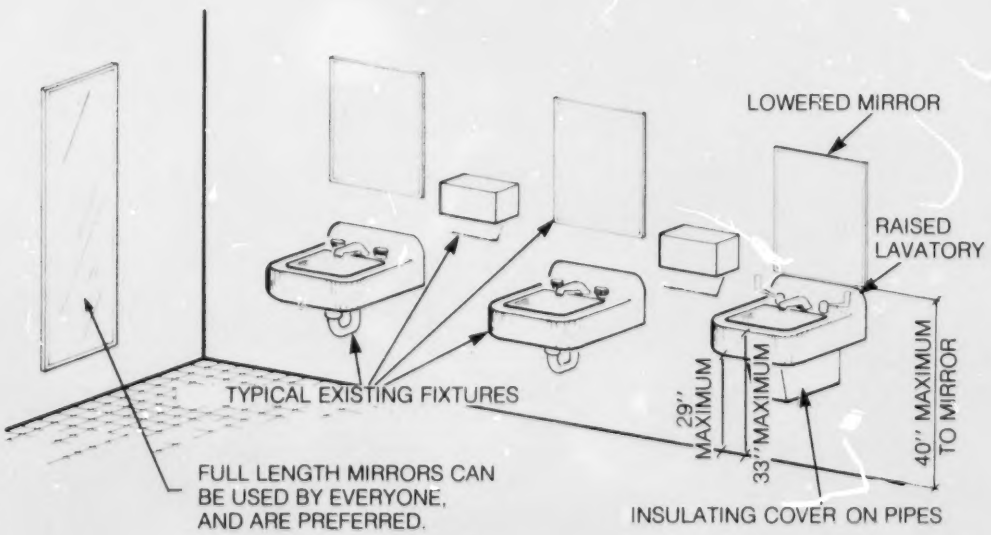
to the water closet can be provided by removing one water closet and its partitions, as shown in Fig. 27, installing one new partition panel with an outswinging door providing 32 inches clearance when open and adding the appropriate grab bar.

The type of toilet selected may also affect the space required in a toilet stall. Wall-mounted toilets provide more toe space than floor-mounted fixtures, adding to the available maneuvering space.

Other points to consider include:

- flush valves easy to reach and operable without great force
- *handrails,* or grab bars, *installed at a convenient height* 13 inches above the toilet seat); *parallel to the floor* to allow the arm to lie along its length; close enough to the partition so the arm cannot slip through *(1-1/2 inches clear, maximum);* and large enough to be grasped without much force *(1-1/2 inches, outside diameter.)*
- outswinging doors meeting the recommendations in *Doors and Doorways*
- urinals mounted for use from a wheelchair: *Urinals may be either floor-mounted, on level with the main floor of the toilet room; or wall-mounted, with the openings of the basins 19 inches from the floor.* Grab bars should be installed either one to each side or one centered above to provide support for standing people with impaired balance or stability.

Fig. 28 Accessibility modifications to existing lavatory



Fixtures and Accessories

Other elements of the toilet room are also important to the accessibility of the facility. Fig. 28 pictures accessibility modifications to existing toilet room fixtures and accessories. A single unit incorporating lavatory, usable light, mirror, soap dispenser, towel dispenser, lavatory controls, waste receptacle and concealed plumbing is commercially available. The unit is designed to be bolted to the wall and meets many building code requirements for accessible lavatories and accessories in one installation.

Design considerations for toilet room fixtures and accessories include.

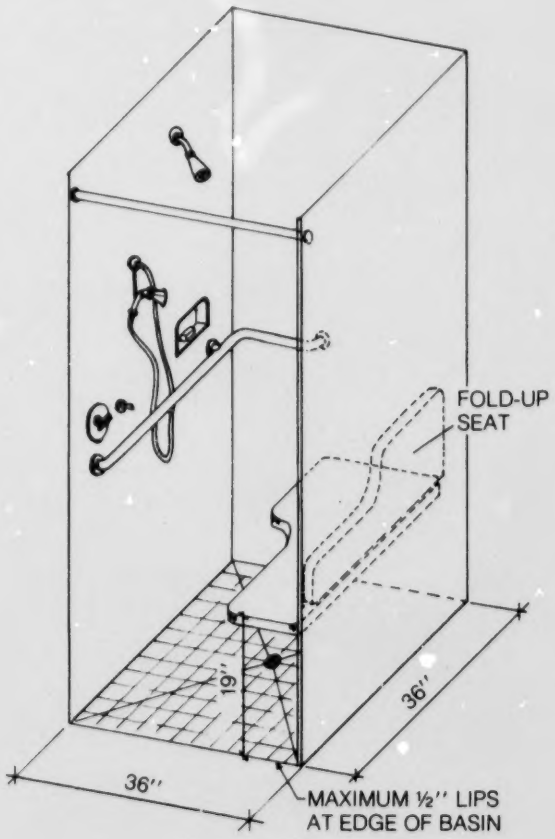
- *lavatories usable from a wheelchair:* Existing lavatories can be raised to allow people in wheelchairs to pull up under them.

- lever or blade-type handles on faucets usable by people who cannot grip round knobs or who have no hands

- *on accessible lavatories, insulated or covered pipes carrying hot water:* Individuals with no sensation in their legs (hypesthesia) can unknowingly receive burns from exposed pipes. As an alternate to enclosing or insulating pipes, water temperature could be reduced to 120°F maximum.

- *some mirrors, shelves, soap and towel dispensers and other dispenser and disposal units mounted low enough (no higher than 40 inches above the floor):* This allows all people to use them without stretching or having to reach too far.

Fig. 29 Accessible shower stall



Tubs and Showers

Tubs, where they are provided in accessible toilet rooms, can be made usable with the addition of grab bars on at least two sides. Showers of either the roll-in or transfer type can be accessible (Fig. 29). Some handicapped people cannot transfer to a shower seat and must roll directly into the shower. Adequate floor space for approach and entrance of the chair is needed, with controls of the same type as for the transfer shower. The transfer shower has an L-shaped seat mounted

to allow the person to transfer from the open side and slide to a position in the corner for lateral support. The controls should be mounted on the opposite wall, so that they can be easily reached from the seat. Lever handles, thermostatic controls and a hand-held shower head on a flexible hose are recommended. Grab bars are also necessary for the use of both seated and standing people. With a fold-up seat, the transfer shower can also function as a roll-in type.

A one-piece molded acrylic shower unit with seat, grab bar and controls to meet the specifications of most codes is available. More information on shower design is presented in Chapter 6.

Fixtures and Equipment

Water Fountains

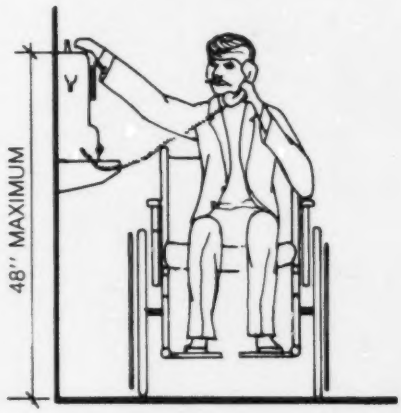
In some cases installation of a new fountain may be more practical than relocation or modification of an existing one. If neither modification nor replacement is planned, however, a paper cup dispenser is another alternative. Cup dispensers, however, will be a continuing expense and may be a maintenance problem.

An existing water fountain that is too high may be lowered or a *side-mounted fountain added.*

The following considerations apply to water fountains:

- *spout and controls located at the front* with the water jet running parallel to the front
- *hand-operated or hand-and-foot-operated controls:* Lever handle or large pushbar controls can be used by most people.
- fountains not protruding into circulation paths where they can be a hazard to the blind

Fig. 30 Accessible public telephone



Public Telephones

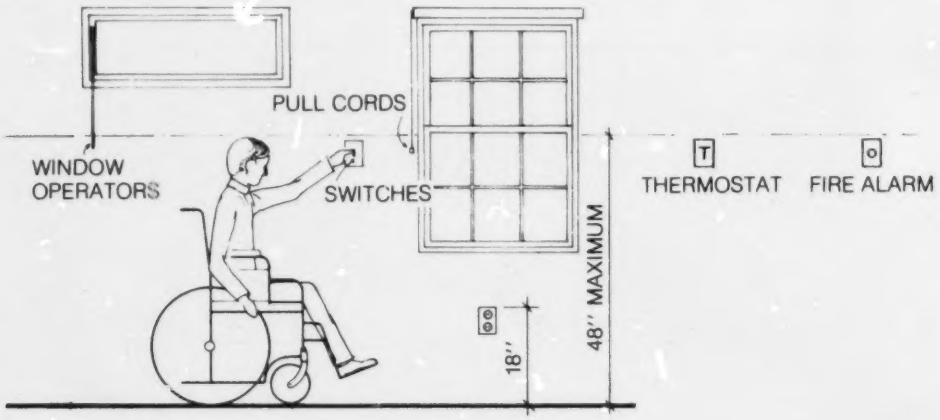
In order to be easily accessible for all people, telephones should:

- *be mounted low enough so that* coin slots, *dials and handsets are within reach of people in wheelchairs* (Fig. 30)
- have clear space in front of the telephone to allow close approach by wheelchairs
- have a folding seat, especially at low-mounted phones
- have adjustable volume control and a three-foot flexible cord on the handset, with easily readable instructions in raised lettering

Operating Mechanisms

Handicapped people have two basic problems with controls and operating mechanisms. One has to do with reach and occurs when controls

Fig. 31 Controls within reach



are too high, too low or too far away. The other pertains to grip and movement, where controls that require grasping and precise movement cannot be operated. To overcome these problems it is recommended that:

- *controls be within reach of persons in a wheelchair:* When mounted between shoulder height and head height of an average seated adult (Fig. 31), controls are reachable by almost everyone.

- clear floor space be provided at controls to allow close approach and manuevering room: The higher a control is placed, the more important close approach becomes.

- controls that are difficult to use be replaced by lever-type handles and switches (Fig. 32): This would include controls such as door knobs, faucet knobs, light switches and thermostats that require gripping or precise movement, as well as controls that require more than one simultane-

Fig. 32 Lever or blade-type handles

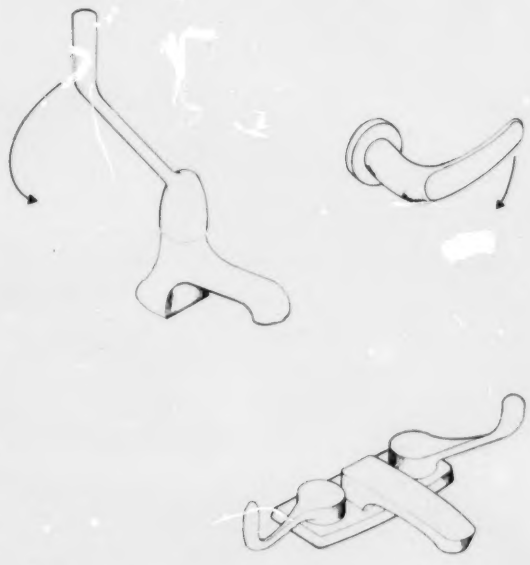


Fig. 33 Examples of symbols to augment verbal messages

ous movement. Lever-type controls can be operated by single imprecise movements such as bumping with hands, elbows or other body parts and do not require gripping. Lever controls can be added to existing fixtures.

Fixed Furniture

Provisions for aisle space between fixed tables or work stations should be made that would be at least as wide as the width of one wheelchair. Tables and other fixed facilities should be designed to provide clearance under their aprons or drawers to allow wheelchairs to pull up under them.

Information Displays and Warning Signals

Wherever signs are normally provided to indicate the use of a room, the following recommendations apply:

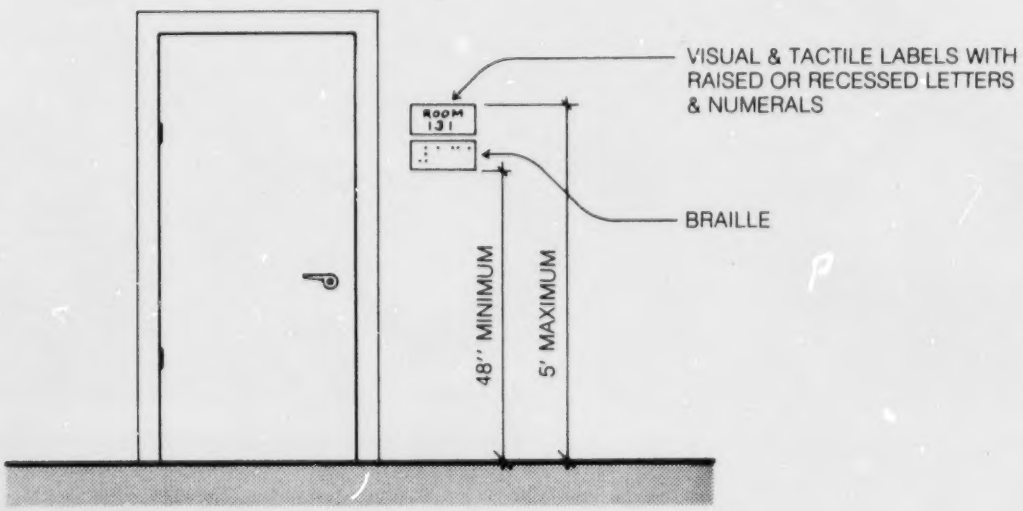
- large, clear lettering in a color contrasting with the background
- wherever possible, messages augmented with symbols (Fig. 33)
- *raised lettering,* interpretable by the visually impaired: Because most blind people do not read braille, the lettering should utilize a simple version of the standard English alphabet. Braille may be added to the sign but is not recommended as the only tactile lettering (Fig. 34).
- *signs at doors mounted on the wall* at knob side *at a height between 4 feet 6 inches and 5 feet 6 inches, preferably at 5 feet* (Fig. 34)
- instructions for use of controls, operating mechanisms, dispensers, telephones, elevators, etc., that are large, legible, tactile and in contrasting colors with their background
- tactile maps or auditory instructions or directions provided in addition to visual directions
- signs that are visible over a wide range and

available for touching, but not protruding into circulation paths where they become a hazard to the blind

- textured floor or pavement to warn the blind of some hazard such as a curb, ramp or stairs, or to designate the location of special features such as building directories

- *warning signals such as fire alarms that are visual as well as audible to warn both blind and deaf*

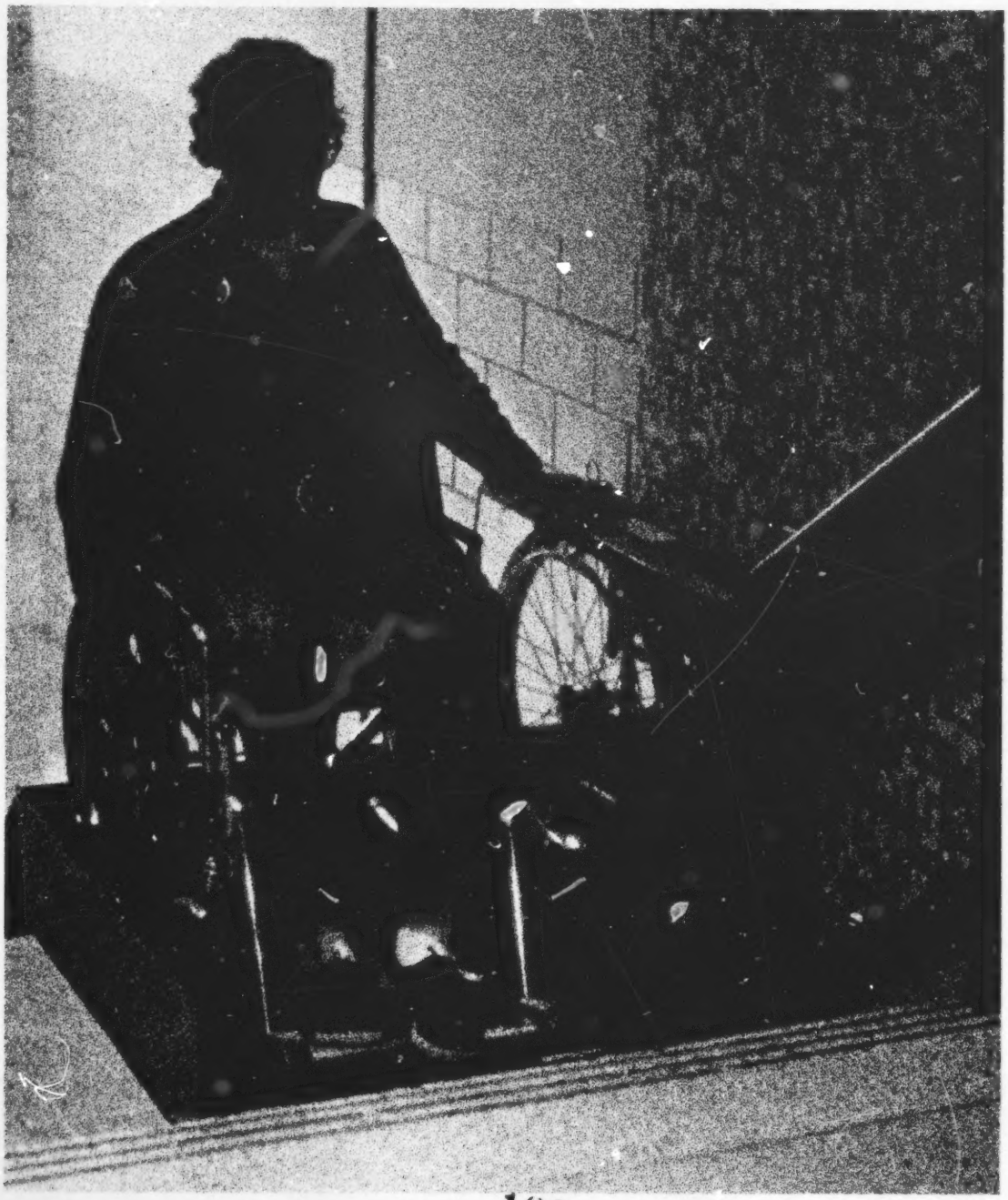
Fig. 34 Room identification



Chapter 6

Special Consideration for Special Spaces

Stephen R. Cotler



Special Consideration for Special Spaces

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The specialized buildings and spaces on a college campus have particular accessibility problems. While they may share the common problems of doors not wide enough or steps in circulation routes, special spaces require additional explanation and specific interpretation of basic design considerations.

The Campus Library

An architectural barrier, the turnstile, immediately confronts a physically handicapped student entering a campus library. Although needed to provide control, it creates an obstacle to persons with mobility problems and sight disabilities. In recent years, some turnstiles have been replaced with electronic detection devices for library book control. It is important when choosing these gate-like structures that sufficient clearance be maintained for passage of persons using wheelchairs or crutches. A clear opening of 36 inches is recommended, where possible, to permit maneuvering while carrying books. If the turnstile is installed, those who cannot use the turnstile will need an alternate entrance.

Clearance of between 36 and 42 inches (Fig. 35) is usually recommended between the shelf edges of stack aisles. This width permits a person in a wheelchair to propel the chair comfortably down the aisles, and the 42-inch dimension will allow an individual in a wheelchair and an ambulatory person to pass each other between stacks. Where wider clearance is not possible, a 32-inch aisle width will be usable by many handicapped people.

It is unreasonable to assume that all books and periodicals can be put within the reach of someone confined to a wheelchair or someone who is exceptionally short. In light of this, library per-

STEPHEN R. COTLER, AIA, is Project Coordinator/Barrier Free Design, State University Construction Fund of New York. He is a coauthor of Architectural Accessibility for the Disabled of College Campuses *and a member of the New York State Advisory Council on the Disabled.*

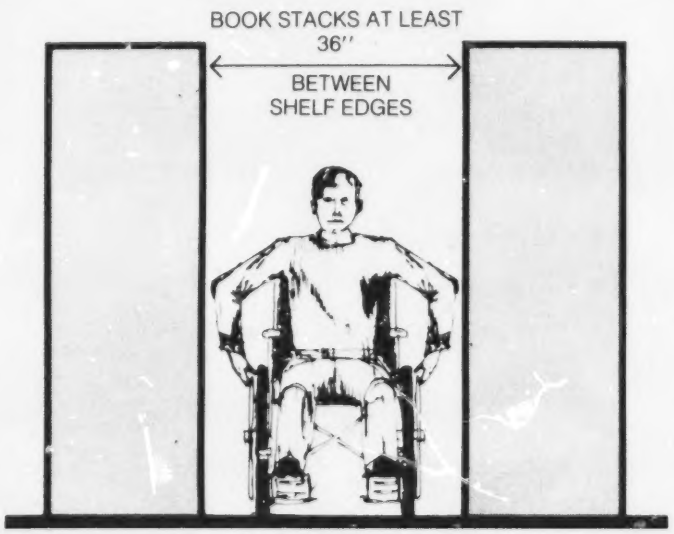
sonnel will be needed to provide certain services to physically handicapped people, such as retrieving out-of-reach material, pulling high drawers from card catalogs, reproducing materials and renewing loaned materials by phone. Where study carrels, reference desks or card catalogs are provided, several need to be accessible to a wheelchair user.

Special resource rooms will help persons with sight disabilities. A soundproofed area is needed so that the handicapped person may be read to, or may listen to taped material without disturbing others or being disturbed by outside activity. These rooms would accommodate reading enlargers, tape recorders, talking calculators and specially designed lighting fixtures. Television enlargers, special tape recorders, taped texts and reference material, brailled material, large-print material and other aids to the sight disabled can also be made available if found necessary. These and other assistive devices are described in more detail in Chapter 8.

Health and Physical Education Building

Physically handicapped individuals, especially those in wheelchairs, frequently do not get adequate amounts of vital physical exercise in normal daily activity. Therefore it is particularly important that certain physical education facilities and programs be made accessible. One should assume that, within reason, a person in a wheelchair will both participate in sports and be a spectator. Accessible circulation will be helpful

Fig. 35 Clear space between book shelves for comfortable access for persons in wheelchairs



in all health and physical education facilities, both exterior and interior. Features affecting circulation include doors, entrances, parking, offices and elevators.

Numerous possibilities exist for physically handicapped people to participate in indoor and outdoor competitive sports. Almost all activities are adaptable with modified regulations. Some areas, such as handball and squash courts, may require architectural changes, such as modifications to the width and threshold of the court entrance, in order to be usable.

Two primary areas of consideration are the exercise areas and the swimming pool. Some of the exercise area facilities of particular value are the mini-gym weight apparatuses (with weight resistance of one pound and up), pegboards, parallel bars, horses, horizontal bars, horizontal ladders, rope climbs, mats and medicine balls. These all provide exercise to individuals despite different degrees of disability.

Physical therapy in a swimming pool is extremely important to the physical condition of some handicapped individuals, making it essential that the pool be accessible. Since a ramp into the pool would interfere with competitive swimming events, an alternative means of providing accessibility may be needed. A swimming pool lift that will serve this purpose is described in Chapter 8.

Locker Rooms

Accessible routes from the locker room are needed to connect all facilities. If possible, one area of the locker room would be set aside for lockers that do not have benches in front of them. A matted or padded dressing table (Fig. 36) within close proximity to these lockers will facilitate clothes changes by those with braces, prostheses and other special equipment. At least one edge (preferably two) located against a wall will provide support for maintaining balance. Installation of a curtain will afford privacy during changing.

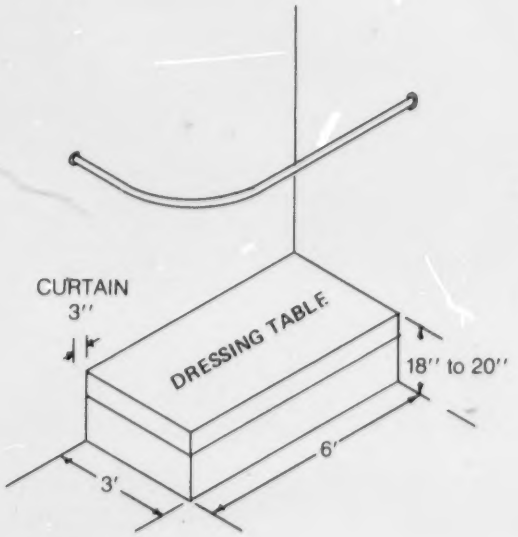
Rest Rooms

Accessible rest rooms, designed according to criteria discussed in Chapter 5, are necessary in both the public (spectator) facilities and in the locker rooms for active participants.

Showers

If possible, a private shower should be provided with a fold-down seat and appropriate grab bars. If rehabilitating an existing facility, a gang

Fig. 36 Matted or padded dressing table



shower can be made accessible, if there is no water-retaining curb, by mounting a fold-down seat near a corner showerhead. The showerhead can then be reinstalled on a sliding rod or flexible hose so that it can be adjusted from 45 to 65 inches, enabling the able-bodied as well as physically handicapped persons to use that shower. Locating the special shower stall in a corner permits the empty wheelchair to be out of the traffic flow of able-bodied persons using the shower room, thus avoiding the possibility that the chair would become an obstacle for others.

Spectator and Performing Spaces

The cultural, educational and recreational aspects of performing arts spaces, lecture hall spaces and field house spaces are as important to those with physical handicaps as to the able-bodied. In planning accessibility, spaces for participation as well as attendance will be needed to accommodate handicapped people.

Seating spaces are desirable in a variety of places in both lecture halls and performing arts theatres. Accessible cross aisles can provide some of the seating area (Fig. 37). Wheelchairs require level floor spaces (Fig. 38) located so that they do not interfere with circulation. Also, handicapped people often attend events with persons who are not handicapped. This necessitates provisions to allow handicapped and nonhandicapped people to sit together, as well as two people confined to wheelchairs. Movable seating can be provided so that there will not be

Fig. 37 Accessible cross aisle wheelchair seating

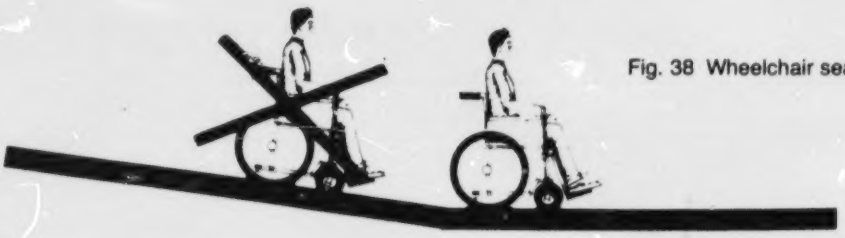


Fig. 38 Wheelchair seating located in a level area

any income lost if these areas are not occupied by spectators in wheelchairs.

For people with sight disabilities and hearing disabilities, the acoustics and lighting are very important. A person with a hearing disability needs good lighting on the speaker so that facial expressions and the mouth of the person can be easily seen. A good amplified sound system is helpful to those who have little residual hearing. A dampened heating-ventilation-air conditioning system will not create background noise that could wipe out the residual hearing of a person with hearing difficulties. When an interpreter is provided for those with hearing disabilities, proper illumination is essential to communication.

Postal Services

Accessible postal services must be located in an accessible facility or in an accessible part of a facility. People in wheelchairs would be assigned boxes at a usable height (Fig. 39). Mail slots in accessible facilities would be placed at the proper height (Fig. 39) and postal windows would not be higher than 42 inches above the floor. Boxes assigned to blind students and faculty members need to be identified tactually and the combination lock modified so that a blind person can use it.

College Bookstore

Many campus bookstores have controlled access by turnstiles. These must either be removed or supplemented with an alternative accessible entrance if persons in wheelchairs or using crutches are to enter. Exit aisles through check-out counters may be made accessible by providing a clear width of 36 inches. Aisle space between displays should permit passage of wheelchairs, with store personnel available to retrieve items on high shelves.

Cafeterias and Dining Halls

Accessibility considerations for cafeterias or dining halls begin with the basic element of an accessible entrance. Turnstiles and traffic control devices must not prevent access.

Suggested layouts for accessible table spaces are shown in Fig. 40. The entire cafeteria does not have to comply with the recommended arrangements, but a reasonable seating choice is desirable for people in wheelchairs. When purchasing new tables for the dining hall, they could be selected to meet standards of accessibility.

To be usable by people in wheelchairs, tables must provide minimum under-table clearance above the floor of 29 inches. If there is an apron, it should be narrow or should be set back at least 13

inches from the outside edge of the table. Many individuals use desk-type wheelchairs, which require a clearance of only 27½ inches between the floor and underside of table. If tables with that dimension are spaced to permit wheelchair circulation, they could be usable by many students in wheelchairs. However, the bench-type wheelchair requires the larger clearance. Tables

Fig. 39 Postal facilities

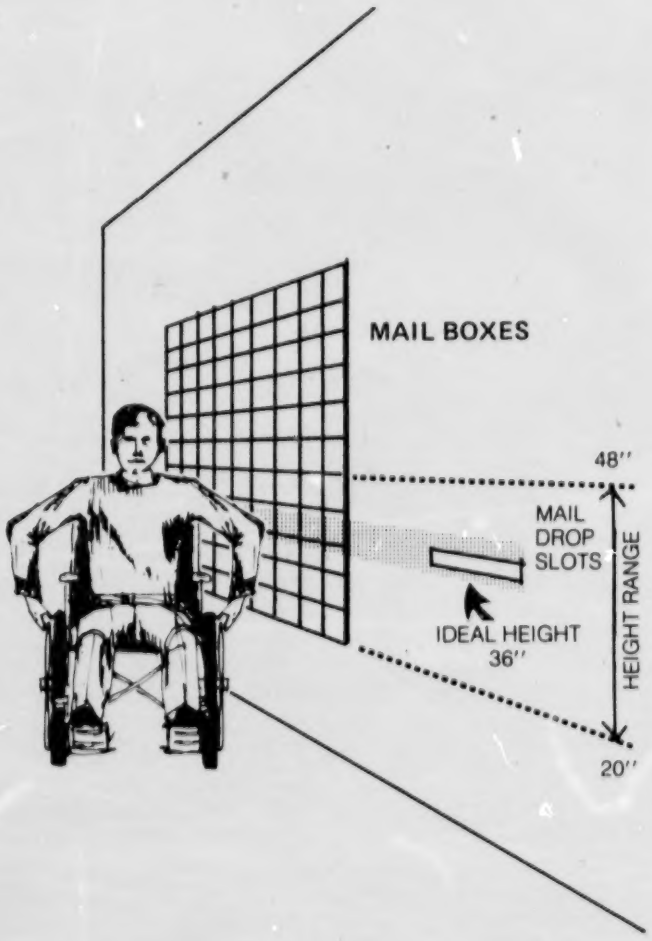


Fig. 40 Accessible table area

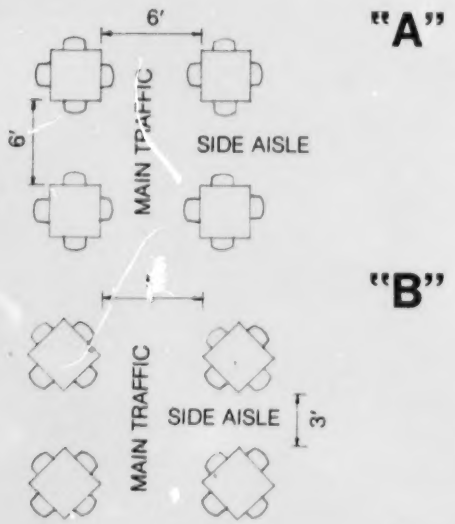
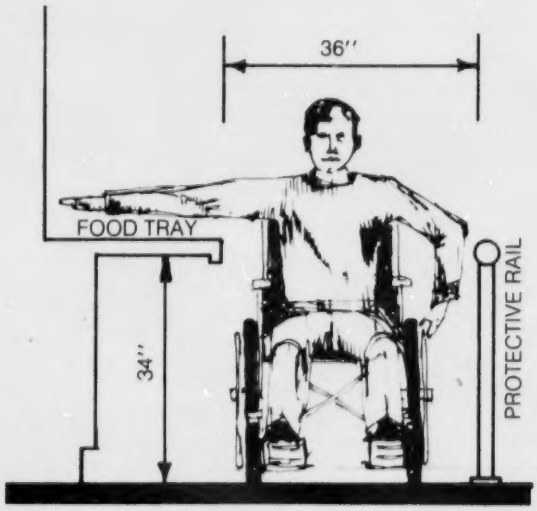


Fig. 41 Cafeteria-style food line



with four legs are preferable to small tables with center pedestals. All tables in areas designated as accessible should meet these minimum requirements.

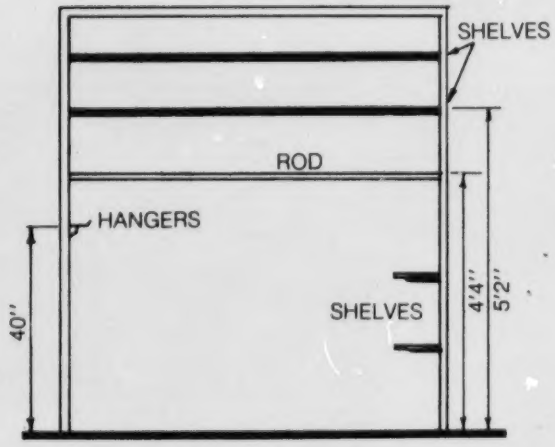
In a cafeteria-style food line, there are certain additional criteria to be met (Fig. 41). Primary consideration is the distance between the food tray track and the protective rail, which is generally recommended to be 36 inches. Where the cafeteria food line makes a right-angle turn, one section at least 48 inches wide will provide turning space for a wheelchair. If food line requirements cannot be fulfilled, a cafeteria staff member will be needed to assist persons in wheelchairs.

Residence Halls

Physically handicapped students have a particular need for on-campus housing for several reasons. Accessible housing may not be available in the community and, even if suitable quarters are found, the student may experience difficulties with public or private transportation. In addition, the physically handicapped student has a greater need for the proximity to classroom and other campus facilities that on-campus housing offers. A sufficient number of accessible residential units, providing a variety of choices to all students, needs to be available.

An important factor in selecting housing to be made accessible will be its location relative to

Fig. 42 Accessible closet



vital or "core" campus buildings and facilities, including the cafeteria, laundry facilities, postal services and the bookstore, as well as sources of nonacademic services and basic necessities.

Students relying on wheelchairs for mobility have a greater need for space in living quarters. A number of accessible campuses have instituted a policy of granting single occupancy in a double room to students in wheelchairs, at no increase in fees over single-occupancy rates.

Since a handicapped student will spend many hours alone in a dormitory room, it is critical that the room be designed for accessibility and independent living. All of these specially adapted rooms will not be used by students in wheelchairs; some will be occupied by blind or deaf students or by individuals with other disabilities. Their needs must be considered in planning room adaptations.

A particular problem is providing signals for deaf students. To compensate for inability to hear a knock at the door, a door bell system connected to a flashing light or a fan that creates an air movement detectable by the deaf person can be used. Another emergency alarm is a vibrating system connected to the bed.

Furniture and fixtures are important to accessibility. In an accessible room, the desk would not have an apron, and it would provide clearance for the wheelchair underneath the desk top. The bed could be a platform-type with drawers underneath where a student with an artificial limb could store the prosthesis overnight. Mirrors would be placed at the height appropriate for use from a wheelchair, and dressers would not have drawers above 42 inches.

A suspended hanging rod in the closet (Fig. 42) will put clothes at a height reachable from a wheelchair. Shelving could be provided on the side of the closet. Shelves at the top of the closet, which would be out of reach from a wheelchair, can be used for long-term storage. When items from this shelf are needed, help could be obtained in retrieving them. Hooks on the side of the closet are also useful.

The first critical aspect of the dormitory bathroom is an adequate clear opening at the door. Traditionally, bathroom doors have been smaller than most other entrances. The historic reason for this was the fact that there was no need to move furniture in or out of the bathroom. Mov-

ing a wheelchair in or out, however, does require a wider clearance.

There are other problem elements in the bathroom. There is often a high marble sill at the door. This sill may need to be replaced if it is too high; and, if it has an abrupt edge, may need to be ramped. Grab bars will help make the toilet usable.

Many campuses provide apartment-type housing for married students. These units will include kitchens or kitchenettes. A number of basic considerations, including wheelchair space requirements, apply to these spaces:

- space to maneuver a wheelchair close to the sink
- a wall oven placed at countertop level usable from a wheelchair
- burnproof material on the counter adjacent to the range top to allow the person who does not have a good grasp to slide an item from the range to the burnproof countertop without having to lift the object
- controls for the range at the front to avoid the need to reach across an open flame or a hot burner
- a pull-out sliding shelf under the countertop to provide a useful space for kitchen utensils while working
- refrigerators located so that an open door will not block the turning space of a person in a wheelchair

Infirmaries

The accessible infirmary's waiting area would permit an individual to wait in a wheelchair, with access to adjacent public rest rooms that are usable by the handicapped. If hospital-type rooms for overnight stays are provided, at least one or two beds could be motorized, capable of being lowered to 20 inches to enable a person to move unassisted from a wheelchair into the bed. The circulation area within the room would have to be adequate to allow movement in a wheelchair, and the adjoining bathroom should be accessible.

The accessibility standards described in Chapter 5 apply to entrances to examination rooms and doctors' offices. In addition to architectural criteria, the health service may need to establish appropriate policies for training staff, providing laboratory services, stocking equipment and medical supplies and establishing working relations with specialists who are able to satisfy the special medical needs of those with various physical handicaps.

It is recommended when formulating these policies that outside professional advice be sought from such sources as nearby rehabilitation centers, rehabilitative units of hospitals, physical therapists and other appropriate specialists.

Signage

When a facility or site is found to be accessible, signage is necessary to inform those who need to know. There are two main purposes for special signage for those with physical handicaps: identification of accessible facilities and designation of accessible paths of travel. While it is important to all handicapped people that accessible buildings be identified, it is essential that accessibility be thoroughly checked before signs are installed. It is a frustrating and potentially dangerous situation for a handicapped person to be led into an inaccessible facility by an inaccurate sign indi-

Fig. 43 International symbol of access

cating accessibility. A great deal of energy, both physical and psychic, is consumed unnecessarily by such an experience. It is equally important to identify those accessible elements within a facility that may be needed by a disabled person. These include elevators, rest rooms, telephones, ramps and special entrances.

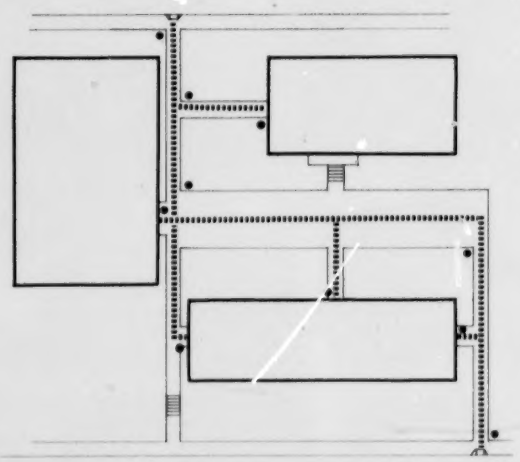
The international symbol of access (Fig. 43) is used to identify accessible buildings or facilities. The symbol should be either black on white, white on black, dark blue on white or white on dark blue. Rehabilitation International, developers of the symbol, suggest that it be displayed on a dark blue field harmonizing with the blue used on international traffic signs. Black is also acceptable.

Special identification of rooms and spaces is essential for those who have sight disabilities and hearing disabilities. Room identification could be placed on the wall adjacent to the entrance door, on the handle or knob side at five feet above floor level. This establishes a standard height that will become familiar to those with sight disabilities. The signs can convey a simple identification, such as a room number made up of not more than four characters. Additional information, such as the name of the room occupant or room type, can be added at a smaller size. The basic sign should display the room number in characters at least two inches high and should have a high contrast (black on white or white on black). Engraved or raised characters will enable a totally blind person to feel the numerals.

Good signage is also very important to the person with hearing difficulties, who often is embarrassed to ask directions because of inability to hear well.

Directional signage (Fig. 44) is important when an exterior accessible route to a building is not the only path to the building or space. This signage would lead a person from an accessible parking spot to an accessible entrance, or can lead someone inside a building to an accessible seating area of a concert hall. The easiest way to

Fig. 44 Accessible paths of travel, with dots showing the location of "symbol of access" directional signage



determine whether routing signage is required is to assume the role of a handicapped stranger visiting the campus for the first time.

Maps that use both visual and tactual systems provide information to sighted, partially sighted and blind persons. These maps can be portable or permanently fixed at an entrance to the campus.

Haptic or tactual maps can be produced using several different methods. Embossed paper maps disintegrate quickly; disseded relief maps, made of wood or rubber, are more difficult to produce; silkscreened maps, in their current state, are easy to produce but are limited in effectiveness as they provide minimal level contrasts and are tiring to use; thermography, the production of raised imagery, deteriorates quickly and involves low contrast. Thermoforming, which is a widely used industrial process for molding and packaging, has provided the greatest advances in the preparation of durable physical-spatial maps for the blind. There are associations for the blind located throughout the country that can provide expertise and valuable help in designing and producing these maps.

Establishing a campus map that can be used by all handicapped people can also help physical plant personnel define accessible routes for those in wheelchairs. In the process of surveying a campus for these maps, inaccessible areas will be identified and become candidates for rehabilitation.

Chapter 7

The Handicapped Student in the Science Laboratory

Robert P. Larsen
with Richard Buchanan and Frank R. Torrey

The Handicapped Student in the Science Laboratory

ROBERT P. LARSEN, Ph. D., is a chemist at the Argonne National Laboratory. As a result of polio in 1930, he became physically handicapped in the lower extremities and walks with the aid of a crutch and cane. He is also a member of the Illinois Division of Vocational Rehabilitation.

RICHARD B. BUCHANAN is an architect for Metcalf and Associates. From 1974 to 1976, he participated in the Syracuse University School of Architecture project to prepare revisions for American National Standards Institute A117.1.

FRANK R. TORREY has been president of Frank R. Torrey Associates, Educational Space Planners, since 1966. He was product manager responsible for research and design of new products and special projects for E. H. Sheldon Company before forming Frank R. Torrey Associates.

This chapter focuses primarily on the accommodations needed by students with mobility or manual handicaps. The need for more information about laboratory accommodations for students with other types of handicaps is recognized, and has been addressed to some extent in the design criteria discussed in Chapter 5 and in special design requirements detailed in Chapter 6. In addition, instructional aids for blind and deaf students that may be applicable to the laboratory situation are described in Chapter 8. While particular attention is given to science laboratories, many of the recommendations in this chapter will apply to other areas, such as language laboratories.

The suggested solutions presented in this chapter are based on the requirements of a mobility handicapped student who uses a wheelchair to travel between classes, who has sufficient arm strength to move independently around a room and who has manual dexterity to carry out most of the laboratory operations with the same degree of skill as that of able-bodied peers. Students with less severe mobility handicaps would be expected to benefit equally from the accommodations.

In planning for students with a variety of handicaps, modifications to work space and equipment storage may be necessary, as well as arrangements for accommodations in work techniques and practices. Making laboratory courses accessible should be approached with imagination and creativity. There is no one solution to modifying existing facilities; the suggestions that follow are presented as a guide to some possible alternatives and as a stimulus to the development of other solutions.

The Usable Laboratory

Most references on design criteria agree on the general requirements for a usable laboratory bench or work station:

- work surface 30 inches above the floor
- clearance beneath the top of 29 inches for a depth of at least 20 inches and a minimum width of 36 inches
- utilities and equipment controls within easy reach, sometimes recommended to be 18 inches from the table edge
- clear aisle width sufficient for wheelchair maneuvering, with the space requirements varying in accordance with work station spaces and arrangements

These dimensions allow the student in a wheelchair to be comfortably positioned relative to the equipment, materials and utilities that are being used, and they provide lateral mobility and the maneuvering space needed to turn the chair around in the aisle.

Existing laboratory benches may be modified for use from a wheelchair by lowering a section of the work surface to the appropriate working height, removing the apron if necessary to provide knee clearance. If storage units infringe upon the clearance needed for leg access and lateral mobility at the bench, these can be removed (Fig. 45) or a drop-leaf extension can be added to the work surface to permit the wheelchair to pull up to the counter along its total length (Fig. 46). The extension could be installed only where there is sufficient aisle width, and its use would require bringing forward the utilities to compensate for the additional width of the work top.

Aisle width for various work station arrangements will need to be determined, based upon the functional requirements of a wheelchair making a 90° turn. Where the clear opening beneath the work surface is 36 inches wide, the minimum aisle width would be 42 inches. However, a 48-inch-wide aisle would be much easier to use and is recommended. It is also recommended that the clear opening beneath the work surface be wider than 36 inches to enhance wheelchair maneuverability.

The standard aisle width in most existing laboratories is 36 inches. Even with a 36-inch wide opening beneath the work surface, the student will find it difficult to maneuver into the lab station. If the student is taking an advanced laboratory course, the aisle width of 36 inches would be totally inadequate. Fig. 47 illustrates by use of a wheelchair silhouette how tight the maneuvering space is in a typical laboratory with a 36-inch aisle. The student would be required to make a number of movements prior to being able to move into the lab station. When the student is in the station, other students would find it difficult to walk through the aisle.

If the handicapped student attempted to move about the laboratory with materials and supplies in such a tight space, the risk of an accident would be increased. Modification that permits 42- to 48-inch aisles (Fig. 48) is recommended.

The silhouette technique can be very helpful when analyzing plans before making modifications or constructing new facilities.

In existing buildings, it is recommended that the designers ride a standard wheelchair through the laboratory to test all 90° turns. Designers sometimes do not realize that wheelchairs are big

Fig. 45 An existing work station and its modification

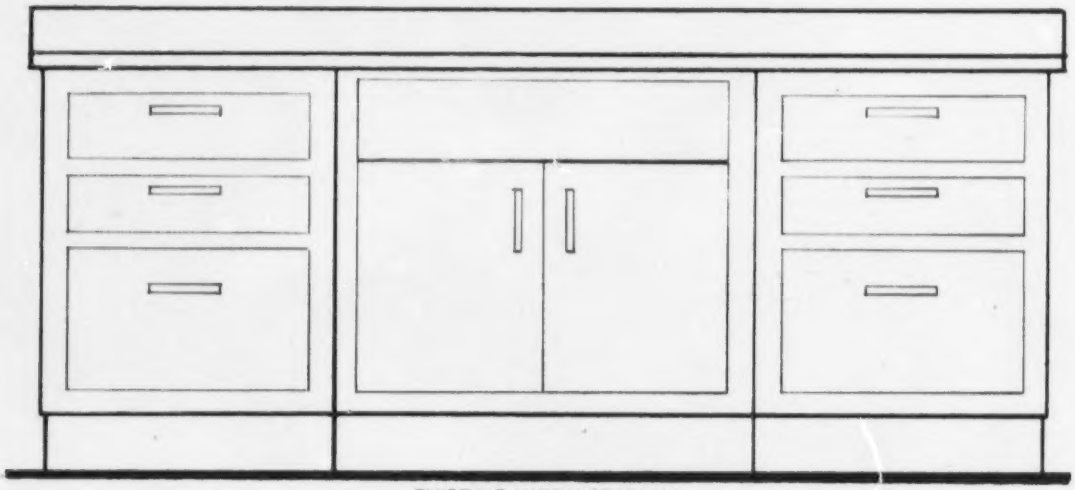
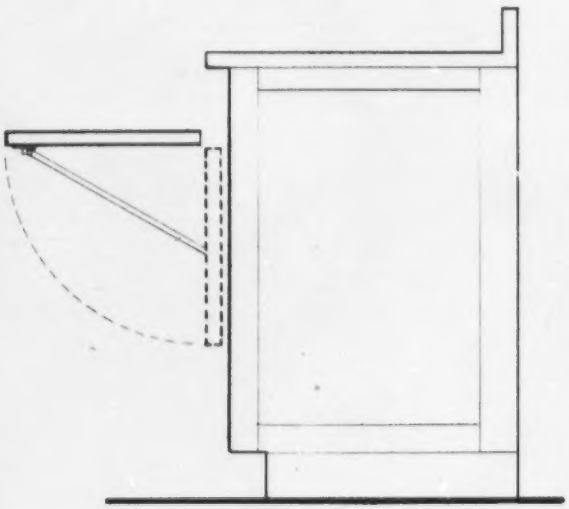


Fig. 46 Drop-leaf extension



and pivot at the wheels. The dimensions for a standard wheelchair are shown in Fig. 49. Even with the footrests pulled in, adequate space in excess of 42 inches is needed and should be considered prior to modifying laboratories.

Another solution might be chosen for laboratories with typical double-face work benches having piping down the center. Where space permits, an accessible work station could be added at one end of such a bench, with hookups to the existing piping. This station should have an adjustable top and storage module for adaptation to different configurations according to student needs. In laboratories with fixed service islands, a similar adjustable work station could be installed at the island.

Where these solutions are not possible, one alternative would be to raise the floor level at a

Fig. 47 Inadequate aisle space of 36 inches

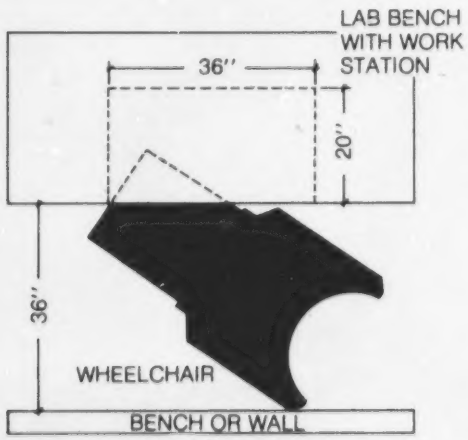
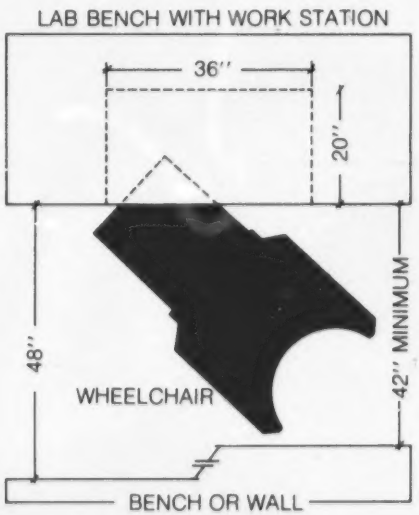


Fig. 48 Recommended aisle space of 48 inches

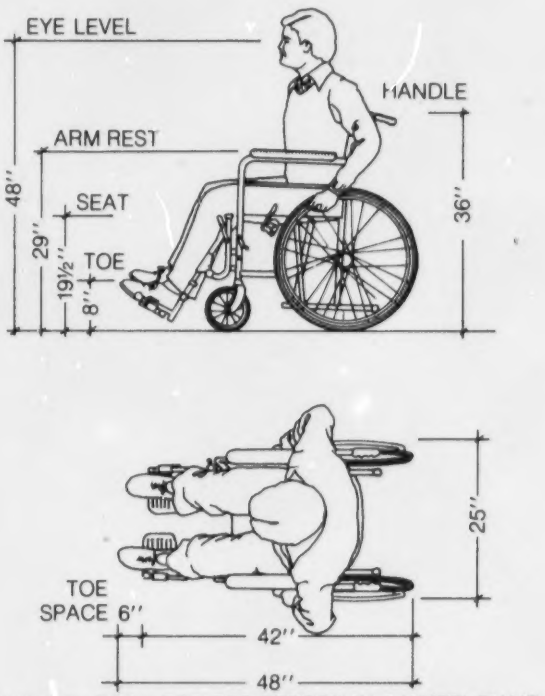


given work station by building a ramp and raised platform to bring the wheelchair to the proper height in relation to the work surface (Fig. 50). Removing any apron or storage units that infringe upon the necessary clearance beneath the top would complete the modification. Placement of such a platform must take into consideration circulation patterns of other students and faculty members who use the laboratory.

In some cases the preferred solution may be to add new work stations. Modular rail-hung and free-standing units are available commercially that provide a range of height adjustments, permitting work surfaces to be set from a 30-inch height to a 36-inch stand-up counter (Fig. 51). These units provide the necessary clearance underneath and can be fitted with a variety of appliances, devices and storage modules to give complete adaptability.

There are a number of factors that should be considered with respect to the location of the work station. Those aspects related to safety are discussed later in this chapter. Others include proximity to shared equipment and common sources of supplies, general traffic patterns within the area, and the possible effects that the presence of a wheelchair and special equipment and accommodations might have on the mobility of other students. In addition, the location should be chosen to permit as much independence as possible for the handicapped student.

Fig. 49 Standard wheelchair dimensions



Laboratory Mobility

Within the laboratory, two types of mobility must be considered: localized and regional. Localized mobility is that required to work at the assigned laboratory station, six to eight linear feet of bench space with attendant utilities and storage facilities. Regional mobility is that required to move from the assigned space to other areas in the laboratory.

Localized mobility is needed frequently and is primarily lateral, i.e., parallel to the bench top, and is required for the step-by-step execution of many experiments.

Regional mobility, which is needed less frequently, may not be absolutely necessary but is

Fig. 50 Ramp and raised platform

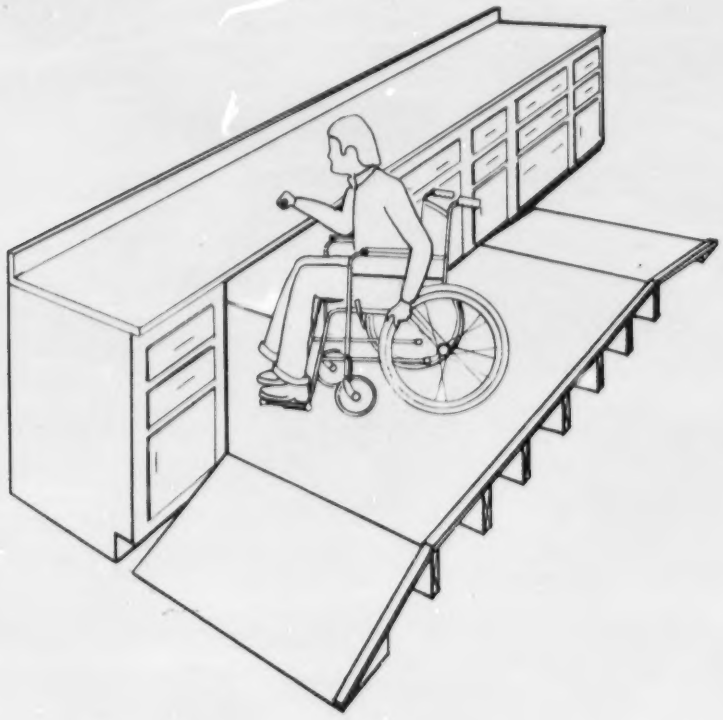
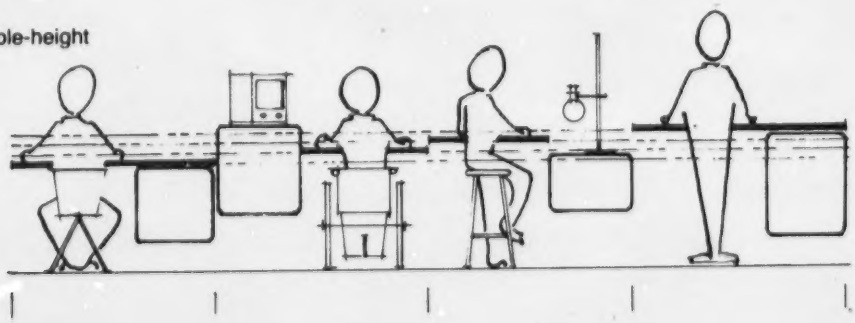


Fig. 51 Rail-hung adjustable-height work stations



highly desirable. It provides access to those features of the laboratory that are shared by all students, such as the analytical balance, and those that may be outside the laboratory, such as the stockroom.

Laboratories that meet general accessibility design criteria (see Chapters 5 and 6) will allow regional and localized mobility for the person in a wheelchair. However, certain aspects of laboratory work may be made more difficult by the restrictions imposed by a wheelchair.

Localized lateral mobility by a handicapped person in a wheelchair can only be achieved by first backing the chair away from the bench while turning, then rolling forward to the bench at the new position. Achieving lateral mobility this way is not particularly restrictive, provided the space requirement for this operation is available and the need is infrequent. However, the space does not always exist and experience indicates that frequent need to move is more the rule than the exception.

Lateral mobility can also be realized if the wheelchair is parallel to rather than facing the bench top. Working from this position is, however, very restricting. The depth of bench space accessible for a two-handed operation is less than one foot and the hand on the bench side is too close to the body for facility in movement. In addition, this position renders a section of the bench not readily visible, which can lead to accidents when backing the chair to a new position.

For those students willing and able to transfer from a wheelchair, one solution that might be considered would be a mobility device that has been in regular use in a professional laboratory for several years. This device offers good lateral mobility, is easy to use and simple to construct. It consists of a chair attached to a rectangular platform that has a caster at each corner (Fig. 52). The casters must be heavy-duty and have 360° swivel on a ball-bearing race. The wheels should be four inches in diameter and have a hard rubber or equivalent surface where they contact the floor. The quality of the bearings on which the wheels turn must be such that little force is required by the individual sitting in the chair to move in any direction. Lateral as well as forward/reverse movements are achieved by grasping the edge of the bench top and applying force in the desired direction.

The platform is fabricated from three-quarter-inch plywood. The width should be about two inches greater than that of the chair, and the length should be about seven inches greater than the front-to-back leg distance. The chair is fastened to the platform with the back legs about two inches from the back edge and equidistant from the side edges. The casters are attached as close to the corners of the platform as possible.

The nature and dimensions of the chair used will depend, in part, upon the needs of the handicapped individual. It must, of course, be sturdy. Wooden chairs may have to be trussed between the legs and the seat, particularly along the sides. The height of the chair will be established by the leg length of the individual using it. Whether or not the chair needs arms will likewise depend upon the individual's needs. Transfer to and from the platform chair is simplified if the chair is armless or has a detachable arm.

Transfer from wheelchair to platform chair is accomplished by backing the platform against a wall. The wheelchair is then positioned for con-

venient transfer, brakes are set, and the transfer is made. Initially, further bracing of the platform chair by an able-bodied person may add an additional measure of confidence for the handicapped person. Transferring back to the wheelchair is essentially a reversal of the above operation.

Regional mobility with this device is readily achieved by using a pair of canes that have been shortened and provided with rubber tips. The chair's maneuverability is excellent, and the force required to propel it is not great. The platform provides a flat, steady surface on which supplies or equipment can be placed and transported from one location in the laboratory to another.

An alternate solution to this mobile platform with chair is the commercially available lab station chair on casters (Fig. 53). These chairs are adjustable in height.

A mobility aid of this type might be useful for students other than those using wheelchairs. Some students may have difficulty standing for

Fig. 52 Platform chair

long periods of time or may find that manual facility is significantly enhanced by working while seated rather than standing. An example of the latter is the person who uses crutches or canes.

These individuals may be able to perform experimental work while sitting on a laboratory stool or while standing, either leaning into a crutch or against the edge of the bench to ensure vertical stability. However, experience in the professional laboratory has shown that both versatility and self-reliance may be enhanced by using the mobility devices described above.

Equipment and Hardware

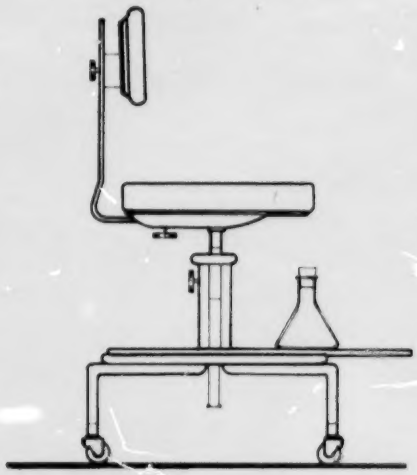
Wall-hung storage units with adjustable height, pull-out shelves (Fig. 54) can provide both storage and work space for special laboratory equipment. Placed on a pull-out shelf at the appropriate height, equipment is stored, ready for use from a wheelchair. These units are available commercially from manufacturers of office furniture and hospital equipment.

Similarly, a pull-out or drop-leaf shelf attached to the individual work station will provide supplementary work space at a usable height. For example, a shelf or counter top mounted at lap-board height will enable a student to use a microscope from a wheelchair.

Replacing knobs on all supply lines with single action lever controls or blade-type handles will make it possible for students with manual impairments to use the equipment. Controls thus adapted need to be operable by exerting a force no greater than five pounds.

Controls, sinks and other equipment at an accessible work station need to be positioned within the horizontal reach from a wheelchair. Installing flexible connections to the electrical, water and gas lines is one way to move the utilities forward.

Fig. 53 Adjustable-height lab station chair on casters



Small volumes of liquid waste such as acid solutions can be managed in several ways. A large funnel that protrudes through the bench top can lead to a large polyethylene bottle, charged with a dilute alkali solution beneath the bench. An alternate method would be to use a large funnel mounted on top of the bench with the funnel tip attached by polyethylene fittings and tubing to a water aspirator. For large volumes of liquid waste, such as those from a condenser, a length of rubber tubing to the drain will suffice.

In chemical laboratories, access to a fume hood presents a special problem. For small-scale operations, a viable solution might be a small hood placed on the bench top (Fig. 55) and exhausted by means of a flexible duct that is connected to

Fig. 54 Adjustable-height storage units and shelves

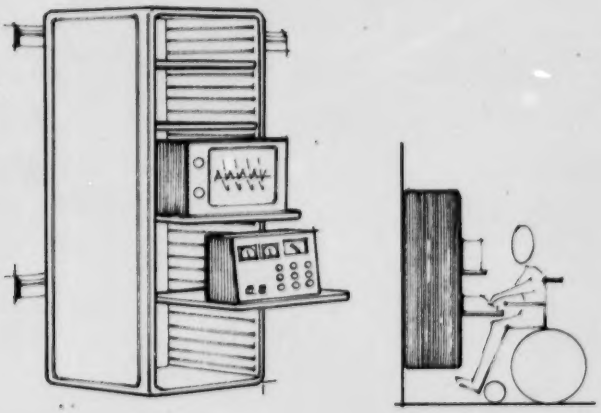
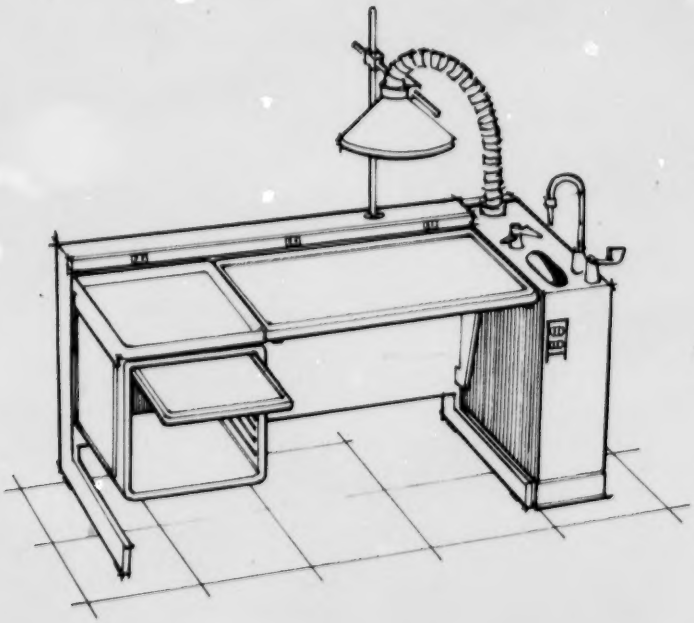


Fig. 55 Individual exhaust unit



the regular laboratory exhaust plenum. These are commercially available.

Storage of the equipment ordinarily assigned to the individual student becomes a problem when shelves and drawers beneath the work bench are removed to permit mobility. A multishelved, cylindrical storage facility maintained on a "lazy susan" may be a partial solution to this problem. Another possible answer might be a storage cabinet on casters that can be slipped under the bench when it is not in use.

Safety

The hazards of much science laboratory work have sometimes been cited as an argument against enrolling a handicapped student. The basic tenet of this common attitudinal barrier is that the handicapped student is either "sick" or has incurred the disability as the result of an accident for which the individual was responsible. Thus the handicapped person is judged to be less capable of coping with a potentially hazardous situation and/or to be more prone to a laboratory accident.

Neither of these views is defensible. The handicapped person in fact is generally more cognizant than the able-bodied of the consequences of an action. Experience has proven to the individual that planning ahead is indispensable. A handicapped person learns to be sure that all the items needed for a specific task are in their place before the task is begun; without this precaution, the result can be a difficult, impossible or dangerous situation, and the handicapped individual is well aware of that possibility. Since planning ahead is the keystone of laboratory safety, the handicapped person is actually better prepared in this respect than the able-bodied.

Surveys made in large industrial concerns, such as DuPont, General Electric and Pittsburgh Plate Glass, have shown that the safety records of handicapped employees are superior to those of the able-bodied.

There are, however, several precautions that should be taken to forestall laboratory accidents or unfortunate results that might occur from an unavoidable incident.

1. The seated student should wear a heavy rubber apron to protect against spilled acid. This protective measure is particularly important for the paraplegic, who has no sensory perception in the lower half of the body.

2. Some means of hosing down the handicapped student at the lab station could be provided to compensate for the possible delay in moving to the safety shower. It might be possible to position an emergency shower directly over the individual's work station. If not, the handicapped student should be located as close as possible to the safety shower, and the pull-chain should be extended to within 48 inches above the floor.

3. Where individual lab stations are equipped with an eyewash, the device might be lowered or a flexible hose attached to bring it to the level of a seated student. Where individual units are not provided, a portable eyewash might be available for use at the station assigned to a handicapped student.

4. The work station should be located as close as possible to the accessible path of egress from the laboratory.

5. In case of emergency evacuation, the handicapped student may need the assistance of one or more able-bodied persons. A "buddy" system can provide assurance of the needed aid. Since

much laboratory work is typically done in pairs, the handicapped student's lab partner would be the logical person to assume this function.

6. Deaf or hearing impaired students will not be able to detect the hiss of an open gas jet. An odorant added to the gas supply will alert that student to an open jet.

Flexibility for Meeting Changing Needs

Given that universities will experience changing demands due to variations in student population and in curriculum, flexibility of furnishings and equipment can be a distinct advantage in planning program accessibility.

If the usable work station described earlier for installation at fixed service islands or at ends of existing laboratory benches is designed as a portable unit, it could be installed in different laboratories as required. Similarly, the previously mentioned rail-hung and free-standing adjustable units could be moved easily to new locations.

A department-wide or campus-wide system could be developed that would use portable work stations as the basic component. Selected spaces within laboratories could be prepared to receive the units, and an inventory of the furnishings could be established for installation as needed. This system would depend, in the science laboratory, upon the availability of conveniently located utility lines.

Assistance from Handicapped Professionals

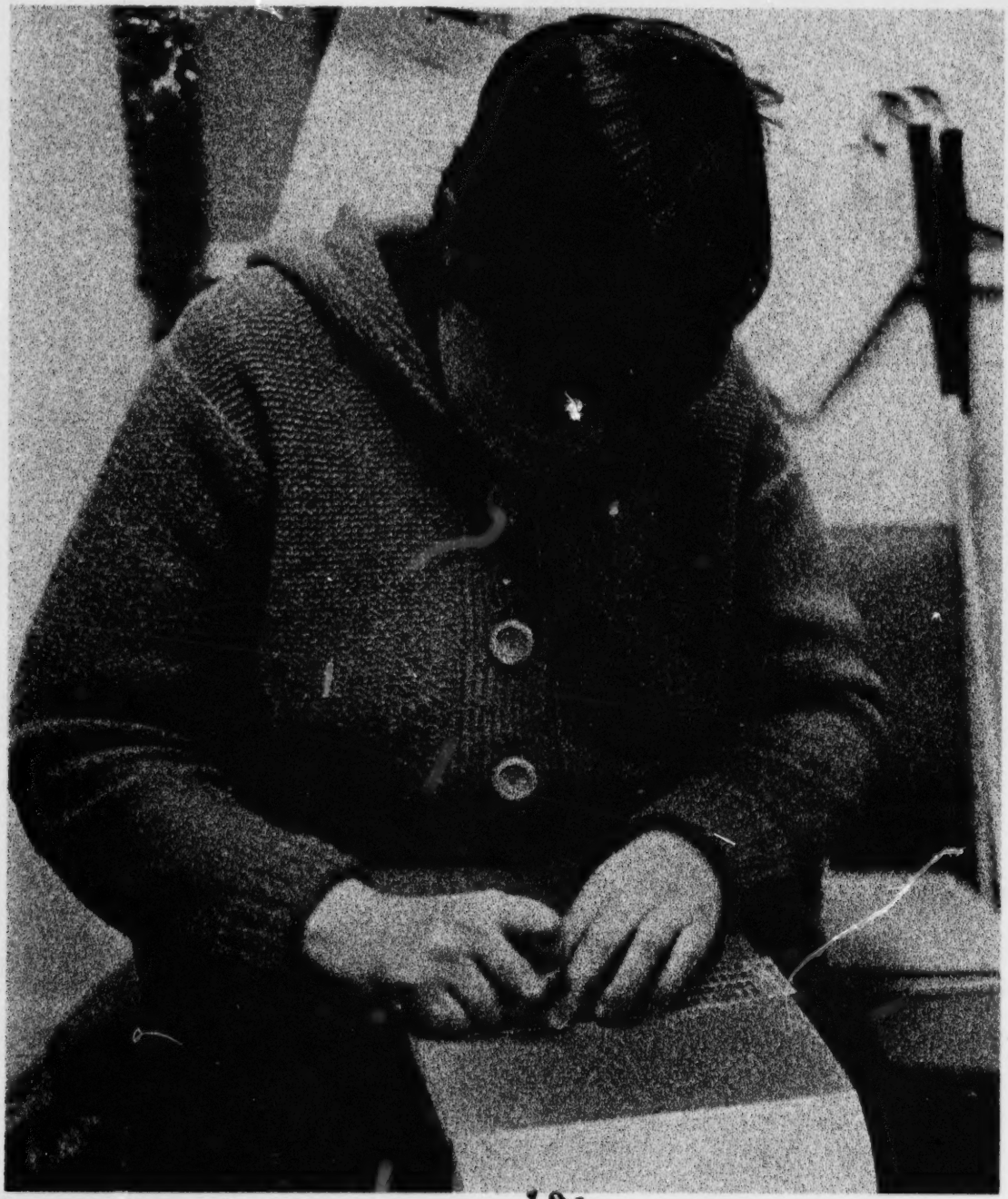
In planning for admission of handicapped students to science laboratories, the assistance of the Project on the Handicapped in the Office of Opportunities in Science of the American Association for the Advancement of Science could prove to be a valuable resource. Nearly 1,000 scientists who have handicaps are registered in what is known as the Resource Group. One general conclusion that has been drawn from the data on this group's experience is the observation that the principal barriers to obtaining an education were the unilateral decisions educators and administrators made in matters affecting the handicapped individual's pursuit of a particular career, not the physical obstacles in the laboratory environment.

The American Association for the Advancement of Science is located at 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Chapter 8

Instructional Aids for Program Accessibility

Stephen R. Cotler



Instructional Aids for Program Accessibility

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STEPHEN R. COTLER, AIA, is Project Coordinator/Barrier Free Design, State University Construction Fund of New York. He is a coauthor of Architectural Accessibility for the Disabled of College Campuses *and a member of the New York State Advisory Council on the Disabled.*

The electronics industry has opened many doors to people with physical disabilities. As a result of Section 504 implementation, many more doors will be opened. The technical capability now exists to provide a great deal of instructional equipment, but the cost of this equipment is relatively high. As demand increases, a drop in cost can be anticipated; this is already occuring in some communications equipment for the deaf.

The following "state of the art" information is broken down into three groups: instructional aids for the mobility impaired, aids for students with sight disabilities, and aids for students with hearing disabilities.

Instructional Aids for the Mobility Impaired

The major environmental barriers facing the mobility impaired person are not instructional equipment needs, but rather architectural barriers built into the facility. Many of these barriers are related to space needs based on the size of the wheelchair and the space required to maneuver the wheelchair. There are, however, several aids available to help the mobility impaired individual.

A number of new innovations and many older devices can aid those with mobility problems. Some of this equipment is for classroom use, and some is for physical education purposes.

Persons with mobility problems frequently suffer effects on other extremities. In addition, ambulatory persons may have disabilities causing loss of manual dexterity. When calculators or other classroom equipment are provided for any course, keyboards having large buttons, with additional space between buttons, will help these students. Special shields also exist that

allow people who are unable to make exact finger movements to use keyboard equipment. Typewriters are available with additional special adaptations for handicapped typists. All electric-powered equipment, including typewriters, staplers and pencil sharpeners, is useful for handicapped students.

In studios and classrooms where drafting tables are provided, tables usable by the handicapped can be selected from among several available styles that allow unobstructed clearance under the board (Fig. 56). This clearance, combined with the drafting table's capability for adjustment in height and tilt angle, makes the item usable by a person in a wheelchair. A parallel rule or T-square permanently attached to the board further enhances usability.

A device called the E-Z Reacher (Fig. 57) can enable a paraplegic to reach books on high library shelves. Libraries could keep one or two of these devices at the desk to be loaned as needed.

In health and physical education, certain commonly used pieces of exercise equipment are usable by and helpful to those with mobility limitations. Exercise equipment of particular value includes mini-gym weight apparatuses, pegboards, parallel bars, horses, horizontal bars, horizontal ladders, rope climbs, mats and medicine balls. All of these provide exercise despite different degrees of disability.

To help students with mobility problems in the swimming program, a swimming pool lift can be installed by the pool (Fig. 58) to transfer students in and out of the water. These lifts are hydraulic and can be operated by an attendant or pool staff member. When the lift is not being used, it can be stored in a separate area, leaving a small opening in the pool deck that can be capped.

Aids for Students with Sight Impairments

The electronics industry has made tremendous contributions in this area. Currently being mar-

Fig. 56 Adjustable drafting table

DESCRIPTION

This drafting table allows unobstructed under table clearances which when in combination with the ability to adjust to any height or angle makes the table completely accessible. A 37½ × 60'' table lists for $558.00.

PLANNING CONSIDERATIONS

From 38'' × 60'' floor space for table plus 4'4'' clearance between user side of table and closest object.

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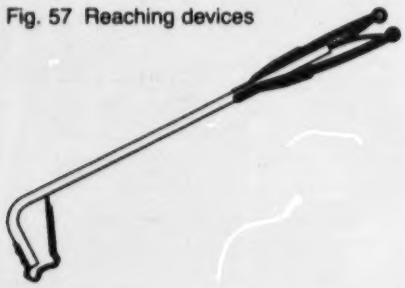
Fig. 57 Reaching devices



DESCRIPTION

These devices enable a person confined in a wheelchair to reach objects beyond their normal reach. The model pictured only weighs 9 ounces and can pick up items weighing two pounds. Cost: $12.00.

PLANNING CONSIDERATIONS

None

Fig. 58 Swimming pool lift

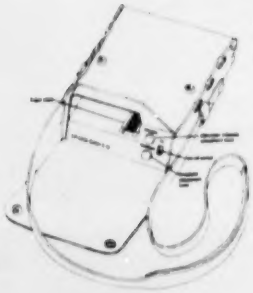
DESCRIPTION

This lift can be used at the side of a swimming pool to help handicapped persons in and out of pools. Cost of the lift ranges from $350 to $400.

PLANNING CONSIDERATIONS

The device is removable so that when not in use, it can be taken away. It is mounted on the floor surface adjacent to the pool side and swings out over the pool.

Fig. 59 Electronic reader



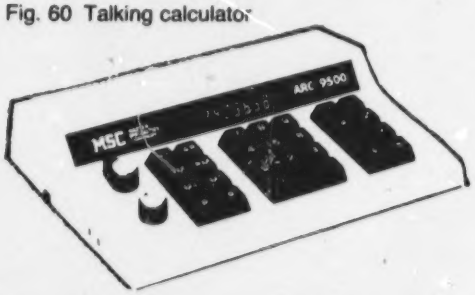
DESCRIPTION

This machine will allow a totally blind person to read any printed matter. Training takes about 90 hours. The machine is portable and can be used whenever or wherever the person wishes. Cost of this piece of equipment is $3,000.

PLANNING CONSIDERATIONS

None — Battery operated

Fig. 60 Talking calculator



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DESCRIPTION

There are several talking calculators on the market. Both desk models and hand held units are available. Also available are models which have printouts in braille.

The current models cost up to $425.00.

PLANNING CONSIDERATIONS

Desk top

Standard current or battery operated

keted are devices that enable a totally blind person to read any written page with any size or mixture of sizes of type or type styles. The device, called an Optacon (Fig. 59), lets a blind person see letters by producing tactile patterns corresponding to their shapes. A blind person can feel the entire array with one finger. Following training and practice, a blind person can achieve reading speeds of more than 50 words a minute. The machine is portable and can be used whenever or wherever the person wishes.

Another machine currently being tested can read more than 60 different type faces and can be set to sound like a male or female voice. The book to be read is placed on a glass surface similar to that used in copying machines. An appropriate use of the machine is in the campus library, where it can be used by a blind student in a resource room or a recording of the book can be made for future reference.

A talking calculator (Fig. 60) has been developed that enables a blind user to carry out mathematical calculations and hear not only the answer but also the input to check for errors. By using a standard tape recorder, the student will have a complete record of calculations. Also available are calculators with braille readouts.

For testing, note taking and other faculty-student written communications, intructors can use braille typewriters. A typewriter of standard appearance that is currently on the market (Fig. 61) has the capability of typing braille grades 1, 2 and 3. The electric typewriter does not require typists to learn new systems or become familiar with new equipment. Any braille paper stock can be used, and a correction key simplifies revisions. This system can be used by faculty members in preparing braille notes for classes or by a blind student in transcribing recorded notes taken in class.

A standard brailler used by blind students is a valuable piece of equipment for the campus library to have. It can be used by the blind student to transcribe notes recorded from the day's classes.

Raised-line drawing kits (Fig. 62) are available to faculty members who wish to "draw a picture" for a blind student. The kits contain a drawing board, a stylus and special sheets of drawing

Fig. 61 Braille writers and typewriters

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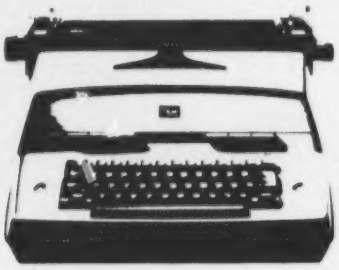


DESCRIPTION:

There are several types of machines that are used to make braille. Manufacturers have typewriters that any typist, sighted or blind, can use to produce braille.

PLANNING CONSIDERATIONS

Check width and current requirements before purchasing.

paper which retain embossed lines enabling a blind person to read the picture. This is especially beneficial in mathematics or other courses that use graphic communications.

Another electronics industry contribution is a tape recorder that can be speeded up or slowed down without affecting the speaker's voice pitch (Fig. 63). For example, a student taking recorded notes of an hour's lecture can bring the recorded cassette to the campus library and audit the lecture in about 24 minutes, without the professor sounding like Donald Duck. Excessively fast speech can be slowed down to be made understandable.

For partially sigted students or faculty members, an existing enlarger system incorporates a television monitor, camera and zoom lens (Fig. 64). The system can enlarge printed material up to 60 times, allowing the individual to read small print but easing the eye fatigue that usually affects partially sighted persons when they use magnifiers or glasses. The system can be used with a typewriter, permitting a typist to view his or her own typing while in progress.

Aids available for vocational training applications include electronic carpenter levels and tape measures that can be read by a blind person, combination squares with raised dots at one-eighth inch intervals and a tire gauge that a blind person can read accurately to within one pound.

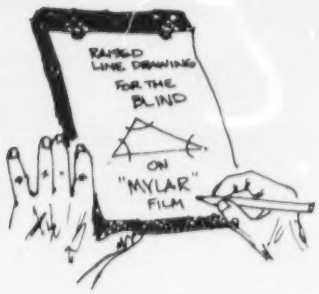
Mathematical instruments including a circular slide rule and a protractor are available for totally blind persons.

The Library of Congress will provide college libraries with talking book machines. These are free, on condition that the Library of Congress is provided with a roster of blind and visually handicapped students. These talking book machines are phonograph records of people reading books. They should not be confused with the machine that actually reads. Also available from the Library of Congress is a cassette playback machine that can be obtained under the same provisions as the talking book machine.

Aids for Students with Hearing Impairments

People with hearing difficulties need both a good acoustical and lighting environment, for their

Fig. 62 Raised line drawing kits



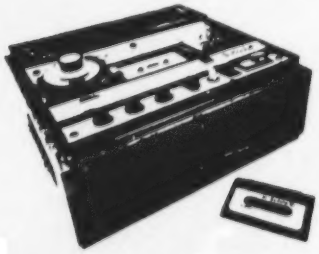
DESCRIPTION

These kits can be used to "draw pictures" that the blind can see. They are useful to faculty and/or rehabilitation counselors in conveying information, maps and pictures to the blind. The kits sell for around $15.

PLANNING CONSIDERATIONS

None

Fig. 63 Time compression and expansion tape recorder



DESCRIPTION

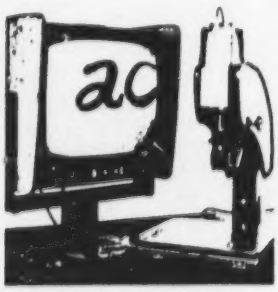
This tape recorder can be used to reduce listening time of standard recorded cassettes, without changing the voice quality of the person speaking, or it can expand the time if speech is quick or garbled. The machine costs approximately $800.

PLANNING CONSIDERATIONS

Size 14¼" × 13½" × 6"

Normal current

Fig. 64 Television enlarger



DESCRIPTION

This television enlarger is available for libraries to help students or faculty with partial vision. There are two models: a large model with a 19" screen and separate camera; and the miniviewer, which has a 12" screen with attached camera. The larger model is approximately $1,700 and the miniviewer camera approximately $1,200.

PLANNING CONSIDERATIONS

Check system sizes since they vary from 30" × 24" to 48" × 24".

surroundings have to be interpreted through senses of vision, touch, smell and taste, with little or no hearing. When hearing is lost or severely impaired, a person's vision is the sense most relied upon to maintain contact with the environment. Therefore, it is extremely important to optimize luminous conditions.

With these criteria in mind, the contemporary small- and medium-sized lecture hall provides an ideal setting for educational communication. It is here that both the luminous environment and the acoustical environment have been especially well planned and controlled. The pie shape of the lecture hall directs both visual and audial focus on the instructor. Heating and ventilating noises have been eliminated or reduced to a tolerable level so that the ambient noise will not wipe out residual hearing, and the lighting is flexible. Sight lines are designed so that they present no problem in viewing the projection screens, exhibits and instructor. The instructor has control of the house lighting, which can be dimmed, and he can spotlight himself, thus further directing student focus. However, this arrangement is not conducive to interaction between hearing impaired students and others in the room. To promote student participation, it is necessary for the hearing impaired individual to make eye contact with other students as well as with the instructor.

It is important that there be no glare or visual distractions, since visual contact is most important. For those with a hearing impairment, visual distractions are comparable to the distraction a hearing person would experience if periodically exposed to loud, extraneous noises during a lecture.

The best speech readers understand only 25 to 30 per cent of the spoken message, which means that they rely to a large extent on facial expressions and body movement to interpret messages. Consequently it is critical that the hearing impaired person have the best possible view of the instructor or lecturer. Lighting should be arranged to avoid shadows or glare on the speaker's hands, face and torso.

Those with some residual hearing have a difficult time comprehending when there is poor contrast between the spoken word and background noises. Acoustically, it is important that background noises be low in volume, since hearing aids amplify noises as well as voice communication, thus increasing difficulty in understanding. Static electricity and interference from electronic equipment also can create problems with hearing aids.

A special concern in laboratories is the inability of the hearing impaired person to recognize that a gas jet is on. Unable to hear the hiss, the individual must rely on other senses, such as smell, for a warning signal. Adding a gas odorant will make the student aware of an open jet. In other emergency situations where alarms are given by sound-transmitting signals, a light or other visual alarm should be added.

Multimedia

Audiovisual equipment plays a significant role in communicating with a hearing impaired person. Projection equipment having a high noise level should be removed from the actual lecture area or have sound-deadening insulation. Visual presentations for hearing impaired persons can stimulate and educate students by carefully illustrating subject matter.

The front projector provides a sharp bright image, but usually has a distractingly high level of noise and requires near total darkness, thus restricting manual communication and speech reading. The rear projection system allows for higher room illumination levels, the instructor does not have to face a bright projection light, and noise is generally isolated.

An overhead projection system can replace the blackboard, allowing the instructor to write and face the class at the same time. This permits students with hearing disabilities to see the instructor in order to speech read. The screen can be placed high, giving students an unobstructed view, and the room illumination level can be kept fairly high. The instructor has a choice of making transparencies in advance, using professionally prepared transparencies or writing directly on an acetate sheet during the lecture.

The 8mm cartridge projection systems can be used for both self-learning and group instruction. Some table-model systems are designed for rear-screen projection, which allows a fully lit room. Because the screen is approximately the size of a large television, this medium is effective for use by small groups and individuals.

Closed circuit videotape television offers many advantages to those with hearing difficulties. Programs can be played at any time, campuses can prepare their own instructional tapes, students can catch missed lectures, and instructional tapes of existing material can be merged with either manual speech or captions. These systems can use either professionally produced, prerecorded videotapes or films, available from regional media centers for the deaf, or self-produced material. The overhead projector transparencies can be made easily by using a large-type typewriter and sketches on a white sheet of paper. Photocopies on an acetate sheet can be made easily and quickly.

Because students with impaired hearing are forced to learn most of what they know visually, audiovisual presentations should be carefully chosen. Wherever a visual cannot project the whole story, a subtitle or caption can be introduced, or the system used can provide for a lighted room to allow instructor/student interaction.

Amplification Systems

Sound amplification systems allow the hearing impaired person to use residual hearing by increasing the level of sound at the ear.

The *hardwire system,* the simplest available system, consists of a microphone, amplifier and receiver. It has a good signal-to-noise ratio and is easy to maintain. The largest drawback is that the interconnecting cables limit movement of the instructor and class. The system can either be set up for an individual or used class-wide with up to 100 receivers.

Another arrangement, the *induction loop amplification system,* eliminates the need for cables from the amplifier to the receiver. Instead of cables to each receiver, a coil of wire is placed around the perimeter of the room. This coil creates an inductive magnetic field. The receiver, in this instance, is a student's hearing aid. Having a similar coil in it, the hearing aid can pick up this amplified audio signal from the loop around the room. This system allows for movement but depends heavily upon the shape of the room loop to determine the best reception.

Another system, *radio frequency,* involves a limited radio broadcast station. This arrangement

eliminates most of the receiving problems encountered with the induction loop, but requires special headphones.

Self-contained hearing aids having the microphone, amplifier and receiver all in one piece function best when the space is acoustically balanced to provide good speech intelligibility. In areas where background noise is a problem, the self-contained hearing aid functions poorly, and often the user is confused by the overabundance of background noise.

Sources for Instructional Aids

General Information on Aids for the Blind

American Foundation for the Blind
15 West 16th Street
New York, New York 11001

American Printing House for the Blind
1839 Frankfort Avenue
Louisville, Kentucky 40206

General Information on Aids for the Deaf

Gallaudet College
7th and Florida Avenues, N.E.
Washington, D.C. 20002

National Technical Institute for the Deaf
Rochester Institute of Technology
One Lomb Memorial Drive
Rochester, New York 14623

General Information on Aids for Handicapped Persons

International Commission on Technical Aids
Housing and Transportation Information Centre
Fack
S-161 25 BROMMA 1
Sweden

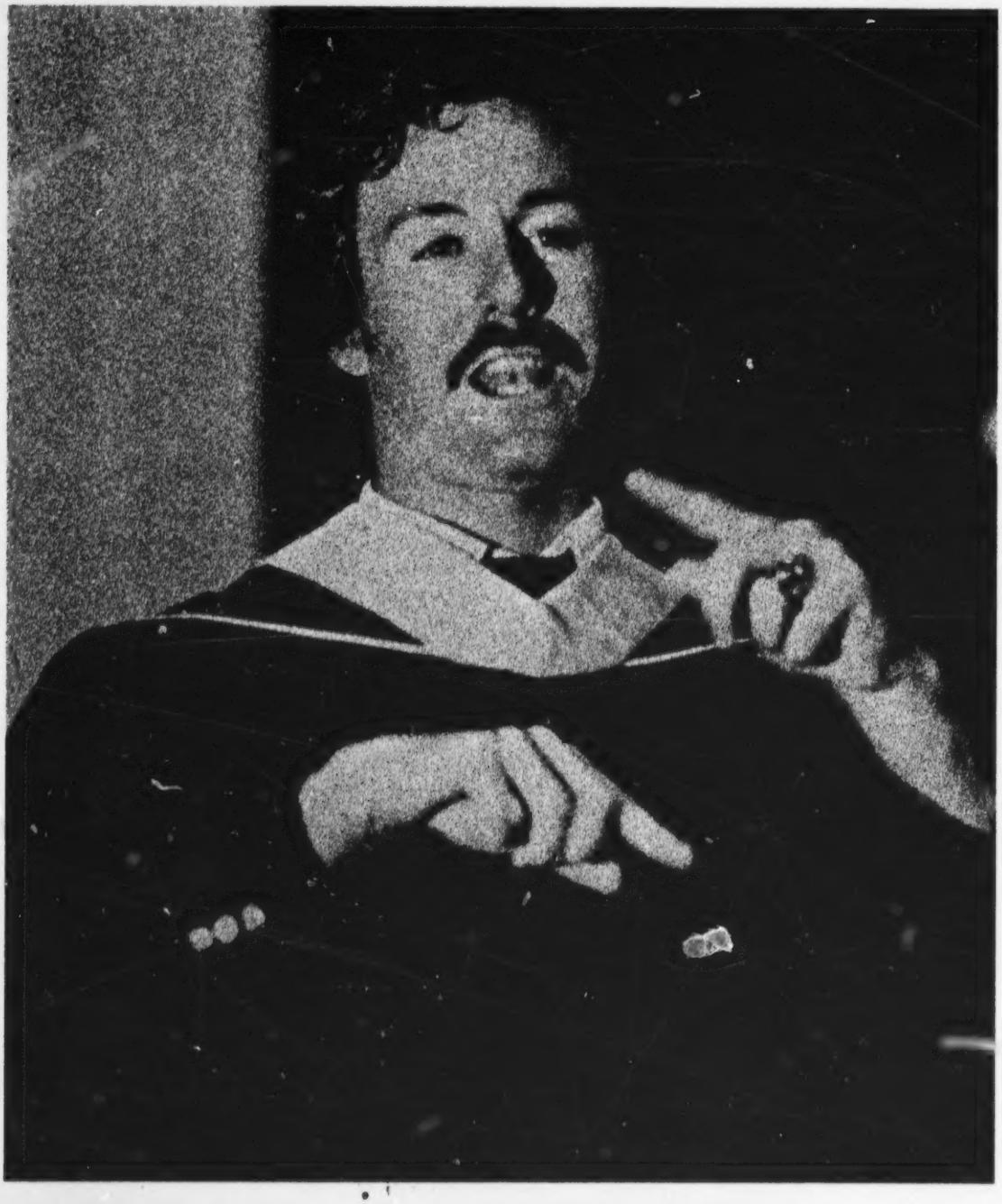
Rehabilitation Services Administration
Department of Health, Education and Welfare
330 C Street, S. W.
Washington, D.C. 20201

Green Pages
641 West Fairbanks Avenue
Winter Park, Florida 32789

Chapter 9

Resource Utilization and Funding Sources

Stephen R. Cotler



Resource Utilization and Funding Sources

STEPHEN R. COTLER, AIA, is Project Coordinator/Barrier Free Design for the State University Construction Fund of New York. He is a coauthor of Architectural Accessibility for the Disabled of College Campuses *and a member of the New York State Advisory Council on the Disabled.*

Compliance with Section 504 will require that some creative and investigative time be spent by campus personnel so that the costs do not become prohibitive.

There has been some concern on the part of the administrators that every room, every space, every building and every path on a campus has to be made accessible. This is not the case, for Section 504 requires program accessibility, not full facility accessibility. And, while campuses may want to work toward more accessibility over the long term, at the outset it will be essential that money be spent where it will be most effective. Just as there is concern about where funding will be derived, there should also be concern that available funds be well spent. This is probably one of the most important points that can be conveyed.

The following steps are necessary in achieving program accessibility:

1. Define what projects are actually required, based upon a thorough examination of academic programs and services offered, personnel needs and essential facilities.
2. Establish priorities.
3. Set a time schedule to meet these priorities.

These aspects of the problem have been discussed in Chapters 2 and 3. Only when a clear, concise architectural program is established can it be decided which projects can be accomplished using existing campus funding and which of the projects will require outside resources.

Providing Maximum Accessibility for a Minimum Expenditure

It is imperative that the costs for high priority projects be kept as low as possible while creating

design solutions that ensure safe and aesthetically pleasing facilities.

Projects Underway

If any facilities are currently under construction or renovation, the physical plant department should review the plans and catch any barriers with "change orders." It is less expensive to accomplish changes at this stage than when the facility is completed, and if the project was begun after June 3, 1977, Section 504 regulations require that it be free of barriers and comply with ANSI A117.1.

Projects still in design should be reviewed thoroughly to determine whether any barriers are being "designed in." It is especially important to review both the drawings and the specifications, since much of the communication between the architect and the contractor concerning accessories and equipment for handicapped users is included in the specifications. Barriers can be detected and changed rather easily in the early design phases, and at less expense than later on.

Piggyback Projects

Existing maintenance and operations funds can be used to provide money to pay for modifications to existing facilities. For example, if a sidewalk leading to a street needs to be repaired, a curb cut can be included in the project. "Piggybacking" projects in this manner is one way to lessen the financial burden of compliance with Section 504.

"Piggybacking" can also occur during the rehabilitation of an existing facility. Section 504 requires that major alterations conform to accessibility criteria. When these criteria are included in the early design stages, the additional cost for accessibility may not be a significant part of the total expenditure.

Replace Instead of Repair

When a piece of equipment is scheduled for extensive repairs, some extra investigation might reveal an opportunity to achieve campus accessibility. For example, if a water fountain needs repair, the institution could apply funds that would have been spent on the repair toward the purchase of a new, accessible fountain. In this case, the funds needed to make this change may decrease and money may be saved on maintenance costs.

Don't Make Unnecessary Modifications

In selecting facilities to be modified, look for those areas that most closely match the required criteria. As a case in point, where there are several toilet rooms in a building, the one requiring the least amount of work could be selected for modifications. A toilet room with an entrance door having a 32-inch clear opening might need less total work than one with a 26-inch clear opening. Even if this toilet room is not the major one on the floor, it would be a reasonable choice as long as it is accessible and is located in a convenient, easily reached place.

Communication

During any project, from the time the designer puts a pencil to paper until the last of the construction is complete, it is imperative that the communication chain not be broken. One broken link can destroy the effectiveness of a project and expend an untold amount of wasted capital.

To illustrate this concept, take the actual case of a toilet room that was to be made accessible. On the plans, a wider stall was carefully drawn showing grab bars in appropriate places. The specifications indicated the toilet fixture as well as the reinforced partitions to accept the grab bars. When the shop drawings were reviewed they, too, appeared to be in compliance. It was not until the facility was complete and occupied that the faulty link appeared. The designer knew that the door had to have a certain clearance, but neglected to communicate this to the contractor, who in turn put a standard 24-inch door on the stall and rendered the entire project inaccessible. This type of occurrence frequently results from lack of experience with accessibility criteria. Unless the campus administrator becomes thoroughly familiar with the requirements and has developed check lists and procedures based on experience, he or she may overlook critical details in communicating with others involved in the project.

Developing an in-house check list based upon whatever standards or codes apply on a given campus is a useful first step. This check list should specify all mandatory and suggested requirements, categorizing each under main topics. An area for comments could be included, as well as an area to indicate whether a criterion is met.

Using this type of check list to review drawings and specifications, one can quickly determine whether there is a missing link in the chain.

Construction Supervision

Supervision and inspection of construction are other activities of key importance. An example from actual experience is a major site project in which more than 50 curb cuts were installed. All used the same drawings and specifications, but all wound up being constructed differently. Some had one-half-inch lips at street level, while others had lips anywhere from two to three inches. The communication from the architect to the contractor was there, but supervision of the actual project was lacking. Ultimately, the final product will have to be changed, but the irritation and time spent to have it redone correctly could have been avoided. Such problems can be avoided if at least one person on the physical plant staff becomes knowledgeable about standards for accessible design.

Program Implementation

After a program and time schedule have been established, the next phase is implementation. Projects will probably fall into two categories: those that can be accomplished by campus staff and those that will require outside consultants and contractors.

The small projects that may be undertaken by campus staff are as important as the larger, more expensive programs. It must be stessed that even these in-house projects need to meet both accessibility standards and aesthetic values to be acceptable. Construction of these modifications should use the same design vocabulary and materials as the building or facility itself. Thus, a brick and concrete building, contemporary in style, which needs an entrance ramp to make it accessible, should not have a ramp constructed out of wood and painted green. This might suffice for a temporary answer until a permanent ramp can be built, but it is not recommended as a long-term solution.

On larger projects the aesthetic value is also important. Architectural access is a crucial element in the effort to mainstream handicapped people.

The more everyone accepts accessibility features for common use rather than perceiving them as special accommodations, the less out of place a handicapped person will feel in that environment.

External Sources of Funds

Federal Funding Sources

When looking for funds to support the cost of making campus modifications, the federal government immediately comes to mind. Several federal programs are authorized to provide funding, but funds have not been appropriated. As in other federal assistance programs, even if funds are appropriated, there probably will be only limited sums available, and these will be sought very competitively. It is important that programs be clearly defined, accurately outlined and budgeted as quickly as possible so that necessary information will be ready in order to compete for these funds when they become available. Reviewing the *Federal Register* daily will reveal any federal funding sources that have emerged.

Other sources of funds should not be overlooked. Several private or corporate foundations or contribution programs, as well as some organizations that work with the handicapped, may help to support the effort. Frequently, local community sources for funds and specific equipment are available.

Two types of funds are available: capital funds and program funds. *Capital funds* are used exclusively for facility construction, furnishings and equipment. *Program funds* cover costs of salaries, materials, transportation, maintenance and rent. Grants officers on campuses can help find sources of capital funding. The following section presents some potential sources of funding and information.

Some existing federal programs are:

Rehabilitation Research and Demonstrations Programs

Authorization for these projects is Section 202, Rehabilitation Act of 1973 [Public Law 93-112]. This is a program to discover, test, demonstrate and promote the use of new concepts and devices that provide rehabilitation services to handicapped individuals. Barrier-removal activities of a unique nature or approach could potentially qualify under this program. For information, contact the Research and Demonstration Specialist in a regional Department of Health, Education, and Welfare office.

Grants for the Removal of Architectural Barriers

Authorization for these grants is Section 607 (effective October 29, 1975) of the Education for All Handicapped Children Act of 1975 [Public Law 94-142]. This program can make funds available for removal of architectural barriers in public and other nonprofit institutions of higher education. Funds for this program have not been appropriated. For information, contact a regional Department of Health, Education and Welfare office.

Community Development Block Grants

Authorization for these grants is Title I, Housing and Community Development Act of 1974 [Public Law 93-383]. A campus facility, such as a theatre building or field house, might qualify for some of these funds to provide barrier-free access, if these facilities serve a community that has obtained a Block Grant. For information, contact

a regional Department of Housing and Urban Development office.

Section 202 Direct Loan Program for Housing for the Elderly and Handicapped

Authorization for this program is Section 202 of the Housing Act of 1959, as amended by the Housing and Community Development Act of 1974 [Public Law 93-383].

This program provides direct long-term financing to nonprofit sponsors for the construction or substantial rehabilitation of rental housing projects for the physically handicapped. Applicants for such loans must be private nonprofit organizations. For information, contact the Assistant Secretary for Housing Production and Mortgage Credit — FHA Commissioner, Department of Housing and Urban Development, Washington, D.C. 20410

Title V Special Demonstration Grants

Authorization for these grants is Title V of the Housing and Urban Development Act of 1970 [Public Law 92-609], as amended by the Housing and Community Development Act of 1974 [Public Law 93-383]. Demonstration Grants are available that could provide assistance for unique approaches to barrier prevention or elimination in the living environment. For information, contact the Assistant Secretary for Policy Development and Research, Department of Housing and Urban Development, Washington, D.C. 20410.

Other Federal Sources

Additional and current information on other federal grants and funding sources is available from the following:

Catalogue of Federal Domestic Assistance ($14.50), published annually by the Office of Management and Budget, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

HEW Catalogue of Assistance, Programs Providing Financial Support Services to States, Communities, Organizations and Individuals. DHEW Publication No. (OS) 73-74, ($2.00), available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

A Catalogue of Federal Assistance Relating to Recreation and Physical Education for the Handicapped 1973, ($2.00), available from the American Association for Health, Physical Education and Recreation, 1202 Sixteenth Street, N.W., Washington, D.C. 20036.

A Summary of Selected Legislation Relating to the Handicapped, ($.70), available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Federal Programs Administered or Monitored by the Bureau of Education for the Handicapped, (Free), available from the Bureau of Education for the Handicapped Office, 400 Maryland Avenue, S.W., Washington, D.C. 20202.

Federal Assistance for Programs Serving the Handicapped, (Free), available from the Office of Handicapped Individuals Clearinghouse, 3529 Switzer Building, Washington, D.C. 20201.

State Support

State Government

Support for both capital and program projects can be obtained from state agencies that serve the handicapped. Agencies serving the handicapped generally include the State Department of Education, State Department of Human Resources (or Mental Hygiene or Health) and the

Governor's Committee on the Handicapped or State Advocate for the Handicapped. A free list of state-provided services can be obtained from the National Information Center for the Handicapped, Closer Look, P.O. Box 1492, Washington, D.C. 20013.

State Vocational Rehabilitation Support

State vocational rehabilitation agencies can obtain funds through the federal Department of Health, Education and Welfare. These funds can be used to increase the accessibility of the environment, particularly of higher education environments. In addition, state vocational rehabilitation funds might be available to assist in providing auxiliary aids. State vocational rehabilitation offices may help campuses obtain some of these funds.

Foundation Grants

There are more than 250,000 foundations within the United States that are making available millions of dollars annually. Some of these foundations serve only organizations, some provide only capital funds, and others provide only program funds. Most foundations have funds for innovative and meritorious projects. Before pursuing a grant or funding for a project, a campus should first determine its needs, then look for a foundation that can fill those needs. When approaching a foundation for a grant, it is important to know what kinds of money are available from the foundation, what programs it will support, the amounts of money it will grant, the geographical locations of grant support and the foundation's priorities for the current year.

Information Sources on Foundation Grants

The *Council on Foundations, Inc.* and the *Foundation Center, Inc.*, both at 888 Seventh Avenue, New York, New York 10019, have information and services available to help in researching potential foundation grants, as does *Funding Sources Clearinghouse, Inc.*, 2600 Bancroft Way, Berkeley, California 94704, and *Taft Information Services*, Taft Corporation, 1000 Vermont Avenue, N.W., Washington, D.C. 20005.

Several publications can help campus administrators with this task:

Handicapped Funding Directory is available from Research Grant Guides, P.O. Box 357, Oceanside, New York 11672.

The Annual Register of Grant Support, approximately $50, is available from Marquis Academic Media, 200 East Ohio Street, Chicago, Illinois 60611.

Community Group Contributions

Special projects can be accomplished with the help of community groups. When a special product or piece of equipment is needed, such as braille typewriters or large-print dictionaries, community groups will often help raise funds. Lions Clubs, Kiwanis Clubs, Boy Scouts, Girl Scouts and other social service organizations can be approached to help with projects.

Organizations Serving the Handicapped

Support from organizations that work with the handicapped can also provide valuable services free or at minimal charge; for example, associations of the blind will provide for free (or for a minimal charge) brailled information for blind students. Alumni and student service groups can also be approached to raise funds for specific projects. These fundraising projects can include large corporations, many of which have special budgets for this type of activity.

140 *A Directory of Organizations Interested in the Handicapped* is available free from People to People Program, Suite 610, LaSalle Building, Connecticut Avenue and L Streets, Washington, D.C. 20036.

The National Information Center for the Handicapped provides a free list of organizations with special programs for the handicapped. This list is available from Closer Look, P.O. Box 1492, Washington, D.C. 20013.

Summary

Compliance with Section 504 requires a different, more comprehensive approach than is normally taken in order to achieve the desired result with a minimum waste of precious funding and time.

The sequence of activities for maximizing the utilization of funds is:

1. organize a thorough, campus-wide survey to determine which projects are necessary for compliance with Section 504.

2. Resolve which projects can be accomplished using existing or projected campus capital funds and which will have to be funded elsewhere.

3. Locate outside funding, either from governmental or private sources.

4. Execute these projects through construction following suggested guidelines.

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Editors' Note

Efforts are now being made throughout the United States to develop facilities that are accessible to handicapped persons. People are now beginning to recognize handicapped persons as a long-neglected minority. This publication is intended to assist campus administrators and all others who seek to alleviate the frustrations handicapped persons feel when faced with inaccessible facilities.

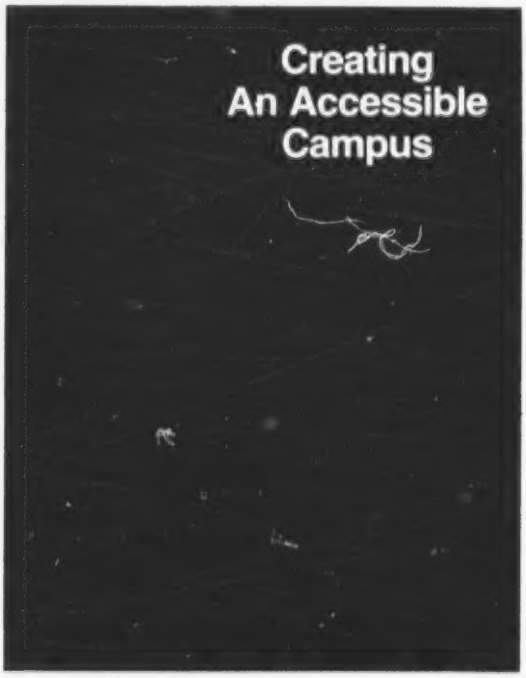
The goal of such efforts should be to promote the contributions and independence of all citizens. Section 504 compliance is a necessary first step in this direction. We hope that *Creating an Accessible Campus* will help lay a foundation for a truly accessible environment that everyone can use.

Working on this publication has been a very rewarding and enjoyable experience. It has been marked by constant contact with extremely competent and concerned persons, including the authors, regional readers, advisory committee and companies that helped produce this book. Special thanks go to Edward F. Scott, Jr. and Maureen Wegmann of Scott Photographics, Inc., whose advice and assistance have been instrumental in the production of *Creating an Accessible Campus;* and to John Kaljee of Artwork Unlimited, whose contributions included designing the format of this book. The editors would also like to thank John Finamore of Moore and Moore, Inc. and the National Center for a Barrier Free Environment for their technical assistance. Contact with these people and the organizations they represent has illustrated that every person's contribution, no matter how large or small, is important in shaping a publication of this type.

We welcome any comments or questions on the contents of this book, and hope that you will contact us if there is any way in which we can be of further assistance. It has been a pleasure being involved with this project.

Maggie Coons
Margaret Milner
Editors

Colophon



The cover of *Creating an Accessible Campus* was designed by Thomas Murphy of Artwork Unlimited. John Kaljee of Artwork Unlimited designed the text format.

Scott Photographics, Inc. typeset this publication using photocomposition equipment. The text is set in 10 point Palatino Medium; chapter headings, figures and page numbers are set in Helvetica.

Moore and Moore, Inc. offset printed the book on 80 lb. white Lustro offset enamel text and cover stocks, saxony finish, using black ink and PMS 313 as the second color. Chapter title page photos were printed using a mezzotint screen. This publication is perfect bound.